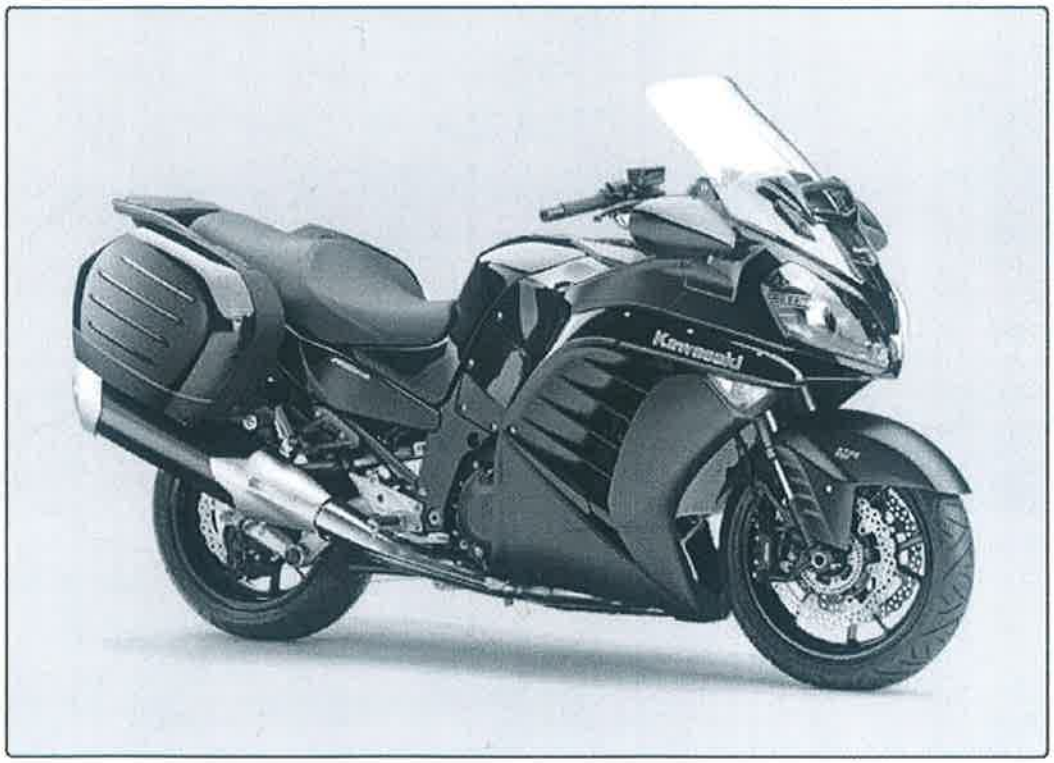
1400GTR ABS
CONCOURS 14 ABS

Motorcycle
Service Manual



IPK SELANGOR

Kawasaki

Quick Reference Guide

General Information	1
Periodic Maintenance	2
Fuel System (DFI)	3
Cooling System	4
Engine Top End	5
Clutch	6
Engine Lubrication System	7
Engine Removal/Installation	8
Crankshaft/Transmission	9
Wheels/Tires	10
Final Drive	11
Brakes	12
Suspension	13
Steering	14
Frame	15
Electrical System	16
Self-Diagnosis System	17
Appendix	18

This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.

Kawasaki

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The right is reserved to make changes at any time without prior notice and without incurring an obligation to make such changes to products manufactured previously. See your Motorcycle dealer for the latest information on product improvements incorporated after this publication.

All information contained in this publication is based on the latest product information available at the time of publication. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.

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Third Edition (0) : Jun. 16, 2016

LIST OF ABBREVIATIONS

A	ampere(s)	IC	integrated circuit
ABDC	after bottom dead center	in.	inch(es)
ABS	antilock brake system	km/h	kilometers per hour
AC	alternating current	L	liter(s)
Ah	ampere hour	LCD	liquid crystal display
ATDC	after top dead center	LED	light emitting diode
BBDC	before bottom dead center	lb	pound(s)
BDC	bottom dead center	m	meter(s)
BTDC	before top dead center	min	minute(s)
°C	degree(s) Celsius	mmHg	millimeters of mercury
cmHg	centimeters of mercury	mph	miles per hour
CPU	central processing unit	N	newton(s)
cu in.	cubic inch(es)	oz	ounce(s)
DC	direct current	Pa	pascal(s)
DFI	digital fuel injection	PS	horsepower
DOHC	double overhead camshaft	psi	pound(s) per square inch
DOT	department of transportation	qt	quart(s)
ECU	electronic control unit	r	revolution
F	farad(s)	rpm	revolution(s) per minute
°F	degree(s) Fahrenheit	s	second(s)
ft	foot, feet	TDC	top dead center
g	gram(s)	TIR	total indicator reading
gal	gallon(s)	V	volt(s)
h	hour(s)	W	watt(s)
HP	horsepower(s)	Ω	ohm(s)

COUNTRY AND AREA CODES

AT	Austria	SEA-B1	Southeast Asia B1 (with Evaporative Emission Control System)
AU	Australia	SEA-B2	Southeast Asia B2
CA	Canada	SEA-B3	Southeast Asia B3
CAL	California (with Evaporative Emission Control System)	TH	Thailand (with Evaporative Emission Control System)
CH	Switzerland	US	United States
DE	Germany	WVTA (FULL)	WVTA Model (Full Power)
EUR	Europe	WVTA (78.2)	WVTA Model (78.2 kW Power)
GB	United Kingdom	GB WVTA (FULL)	GB WVTA Model (Full Power)
MY	Malaysia	Euro 3	Euro 3 Model (2017 MY ~)
PH	Philippines		

This is product contains the encryption algorithm “MISTY” developed by MITSUBISHI ELECTRIC CORPORATION.

EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated crankcase emission (1) and exhaust emission (2) control systems in compliance with applicable regulations of the United States Environmental Protection Agency and California Air Resources Board. Additionally, Kawasaki has incorporated an evaporative emission control system (3) in compliance with applicable regulations of the California Air Resources Board on vehicles sold in California only.

1. Crankcase Emission Control System

This system eliminates the release of crankcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the intake side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the fuel injection system.

2. Exhaust Emission Control System

This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this motorcycle. The fuel, ignition, and exhaust systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

The exhaust system of this model motorcycle manufactured primarily for sale in California includes a catalytic converter system.

3. Evaporative Emission Control System

Vapors caused by fuel evaporation in the fuel system are not vented into the atmosphere. Instead, fuel vapors are routed into the running engine to be burned, or stored in a canister when the engine is stopped. Liquid fuel is caught by a vapor separator and returned to the fuel tank.

The Clean Air Act, which is the Federal law covering motor vehicle pollution, contains what is commonly referred to as the Act's "tampering provisions".

"Sec. 203(a) The following acts and the causing thereof are prohibited...

(3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to its sale and delivery to the ultimate purchaser, or for any manufacturer or dealer knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser.

(3)(B) for any person engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles or motor vehicle engines, or who operates a fleet of motor vehicles knowingly to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title following its sale and delivery to the ultimate purchaser..."

NOTE

○*The phrase "remove or render inoperative any device or element of design" has been generally interpreted as follows.*

1. *Tampering does not include the temporary removal or rendering inoperative of devices or elements of design in order to perform maintenance.*
2. *Tampering could include.*
   a. *Maladjustment of vehicle components such that the emission standards are exceeded.*
   b. *Use of replacement parts or accessories which adversely affect the performance or durability of the motorcycle.*
   c. *Addition of components or accessories that result in the vehicle exceeding the standards.*
   d. *Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.*

WE RECOMMEND THAT ALL DEALERS OBSERVE THESE PROVISIONS OF FEDERAL LAW, THE VIOLATION OF WHICH IS PUNISHABLE BY CIVIL PENALTIES NOT EXCEEDING $10 000 PER VIOLATION.

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Federal law prohibits the following acts or the causing thereof. (1) The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below.

- Replacement of the original exhaust system or muffler with a component not in compliance with Federal regulations.
- Removal of the muffler(s) or any internal portion of the muffler(s).
- Removal of the air box or air box cover.
- Modifications to the muffler(s) or air intake system by cutting, drilling, or other means if such modifications result in increased noise levels.

Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment are specified, do not use makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

For the duration of the warranty period, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your vehicle.

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki Motorcycle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki motorcycles are introduced by the Service Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to Use This Manual

In this manual, the product is divided into its major systems and these systems make up the manual's chapters. The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

For example, if you want stick coil information, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Stick Coil section.

Whenever you see symbols, heed their instructions! Always follow safe operating and maintenance practices.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

This manual contains four more symbols which will help you distinguish different types of information.

NOTE

○*NOTE indicates information that may help or guide you in the operation or service of the vehicle.*

- Indicates a procedural step or work to be done.

○Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.

★Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

General Information

Table of Contents

Before Servicing 1-2
Model Identification 1-7
General Specifications 1-8
Unit Conversion Table 1-11

1

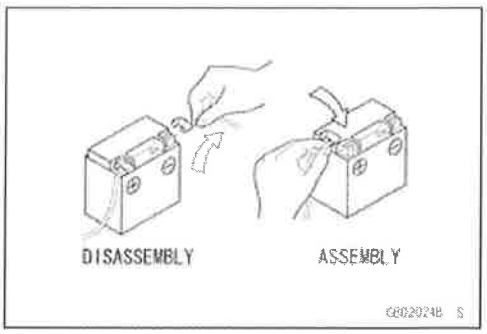
Before Servicing

Before starting to perform an inspection service or carry out a disassembly and reassembly operation on a motorcycle, read the precautions given below. To facilitate actual operations, notes, illustrations, photographs, cautions, and detailed descriptions have been included in each chapter wherever necessary. This section explains the items that require particular attention during the removal and reinstallation or disassembly and reassembly of general parts.

Especially note the following.

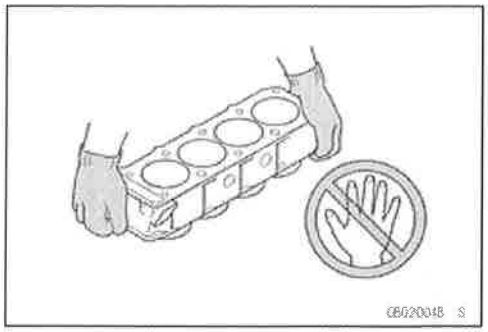
Battery Ground

Before completing any service on the motorcycle, disconnect the battery cables from the battery to prevent the engine from accidentally turning over. Disconnect the ground cable (–) first and then the positive (+). When completed with the service, first connect the positive (+) cable to the positive (+) terminal of the battery then the negative (–) cable to the negative terminal.



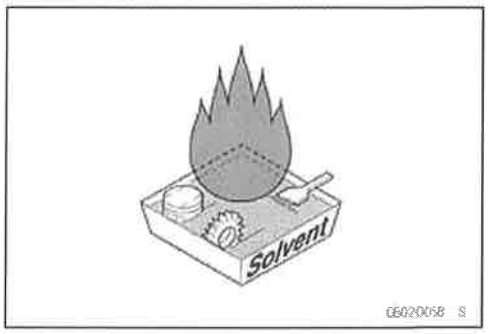
Edges of Parts

Lift large or heavy parts wearing gloves to prevent injury from possible sharp edges on the parts.



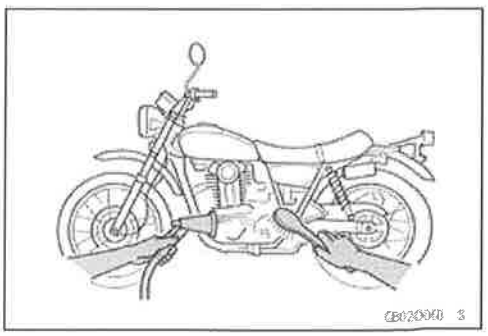
Solvent

Use a high flash-point solvent when cleaning parts. High flash-point solvent should be used according to directions of the solvent manufacturer.



Cleaning Vehicle before Disassembly

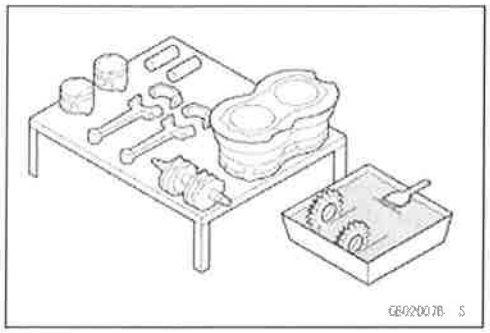
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

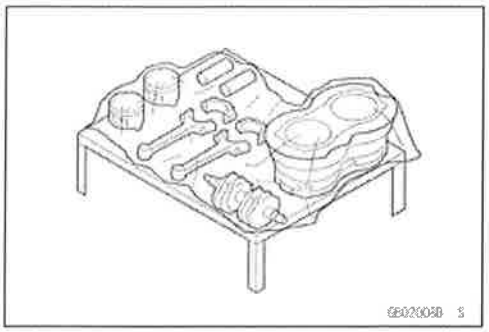
Arrangement and Cleaning of Removed Parts

Disassembled parts are easy to confuse. Arrange the parts according to the order the parts were disassembled and clean the parts in order prior to assembly.



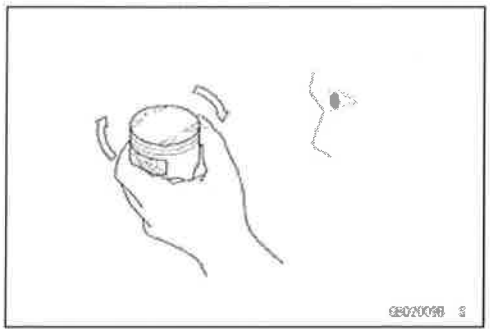
Storage of Removed Parts

After all the parts including subassembly parts have been cleaned, store the parts in a clean area. Put a clean cloth or plastic sheet over the parts to protect from any foreign materials that may collect before re-assembly.



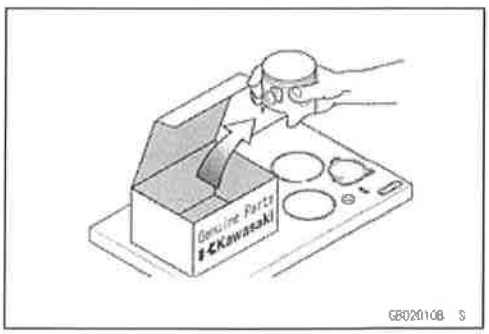
Inspection

Reuse of worn or damaged parts may lead to serious accident. Visually inspect removed parts for corrosion, discoloration, or other damage. Refer to the appropriate sections of this manual for service limits on individual parts. Replace the parts if any damage has been found or if the part is beyond its service limit.



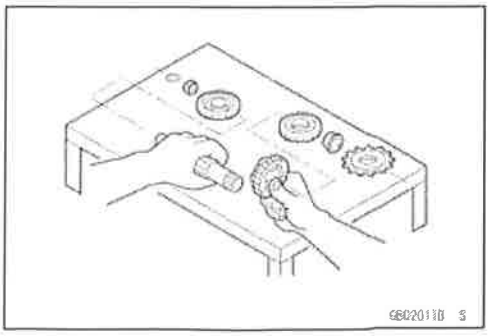
Replacement Parts

Replacement parts must be KAWASAKI genuine or recommended by KAWASAKI. Gaskets, O-rings, oil seals, grease seals, circlips, cotter pins or self-locking nuts must be replaced with new ones whenever disassembled.



Assembly Order

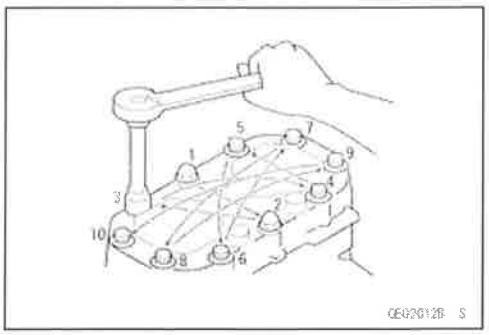
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



Before Servicing

Tightening Sequence

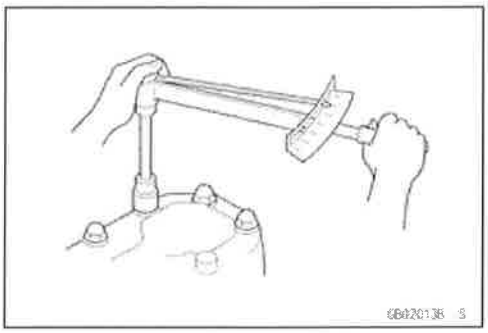
Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter turn and then remove them. If the specified tightening sequence is not indicated, tighten the fasteners alternating diagonally.



Tightening Torque

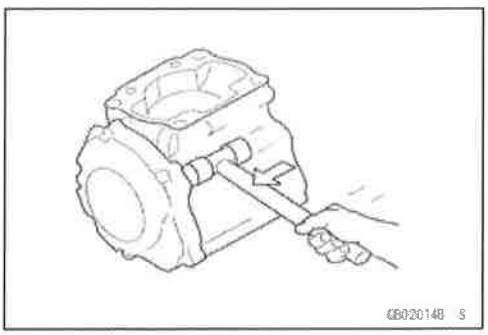
Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench.

All of the tightening torque values are for use with dry, solvent - cleaned threads unless otherwise indicated. If a fastener which should have dry, clean threads gets contaminated with lubricant, etc., applying even the specified torque could damage it.



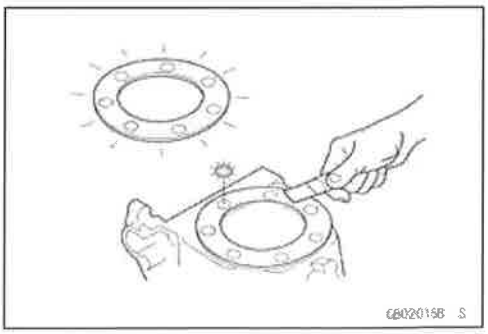
Force

Use common sense during disassembly and assembly, excessive force can cause expensive or hard to repair damage. When necessary, remove screws that have a non -permanent locking agent applied using an impact driver. Use a plastic-faced mallet whenever tapping is necessary.



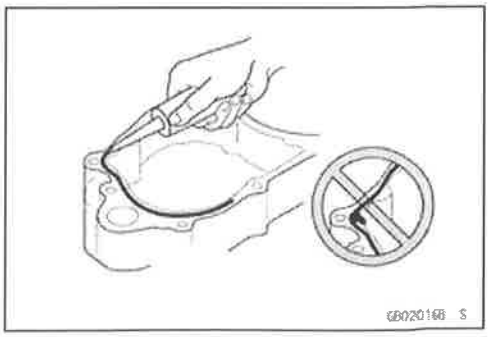
Gasket, O-ring

Hardening, shrinkage, or damage of both gaskets and O-rings after disassembly can reduce sealing performance. Remove old gaskets and clean the sealing surfaces thoroughly so that no gasket material or other material remains. Install the new gaskets and replace the used O-rings when re-assembling.



Liquid Gasket, Non-permanent Locking Agent

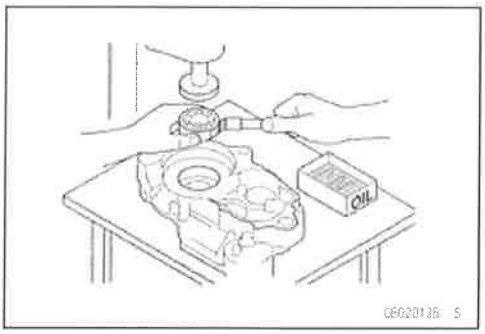
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

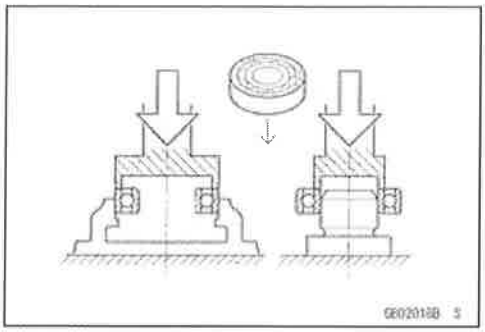
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

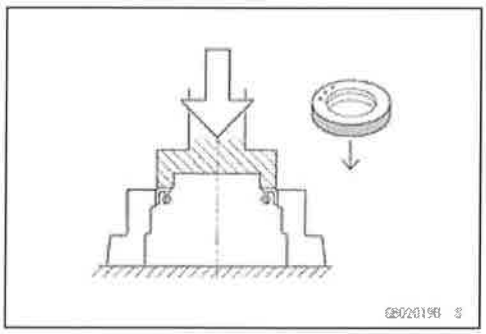
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

Pressing the incorrect race can cause pressure between the inner and outer race and result in bearing damage.

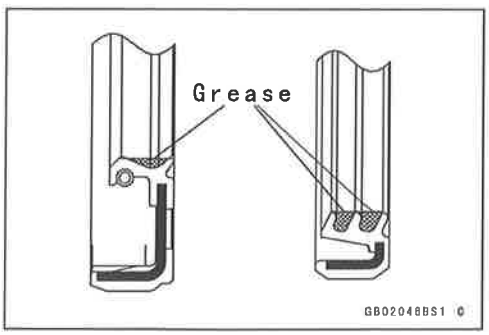


Oil Seal, Grease Seal

Do not remove pressed oil or grease seals unless removal is necessary. Replace with new ones whenever removed. Press new oil seals with manufacture and size marks facing out. Make sure the seal is aligned properly when installing.

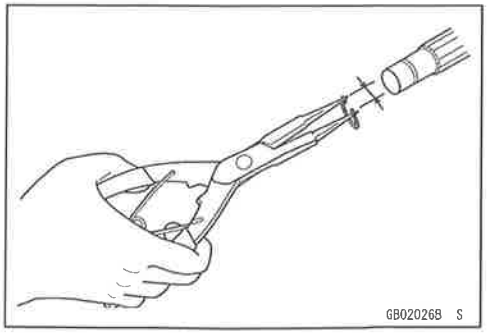


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

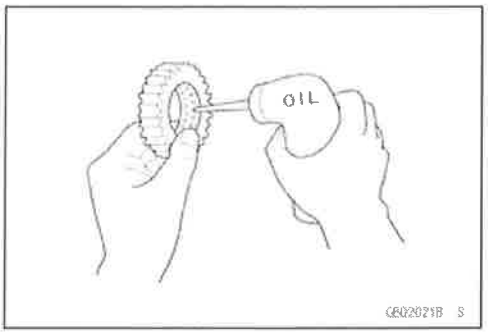
Replace the circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



Before Servicing

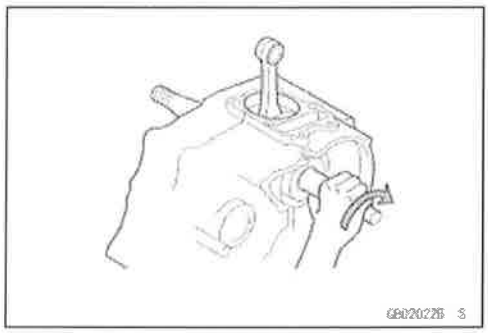
Lubrication

It is important to lubricate rotating or sliding parts during assembly to minimize wear during initial operation. Lubrication points are called out throughout this manual, apply the specific oil or grease as specified.



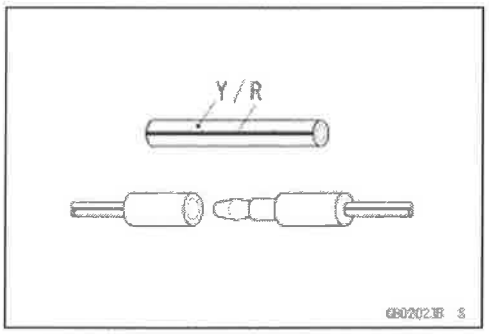
Direction of Engine Rotation

When rotating the crankshaft by hand, the free play amount of rotating direction will affect the adjustment. Rotate the crankshaft to positive direction (clockwise viewed from output side).



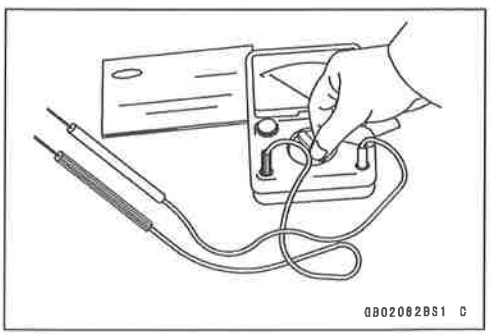
Electrical Wires

A two-color wire is identified first by the primary color and then the stripe color. Unless instructed otherwise, electrical wires must be connected to those of the same color.



Instrument

Use a meter that has enough accuracy for an accurate measurement. Read the manufacture's instructions thoroughly before using the meter. Incorrect values may lead to improper adjustments.



Handling Electronic Parts

Severe impacts to electronic parts such as the ECU, sensor, and relay can damage them. If dropped on a hard surface, replace such parts with new ones.

If a high voltage that is created by static electricity is applied to the electric parts, it could cause them to fail. To avoid this, touch a non-painted metal surface to discharge any static electricity that is accumulated on your body before inspecting or replacing electric parts.

Be careful not to touch the electrical terminals of the electronic parts. The static electricity discharged from your body could damage them or deform the electrical terminals.

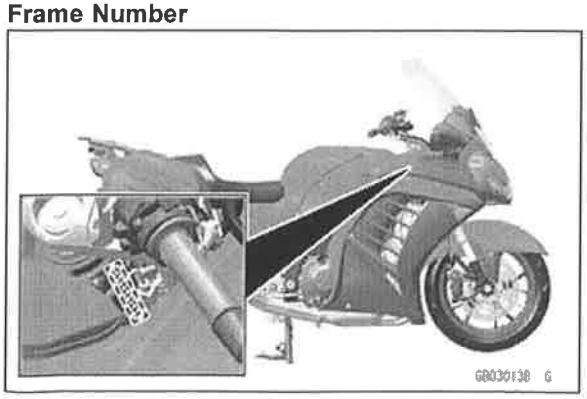
Model Identification

ZG1400EF Left Side View

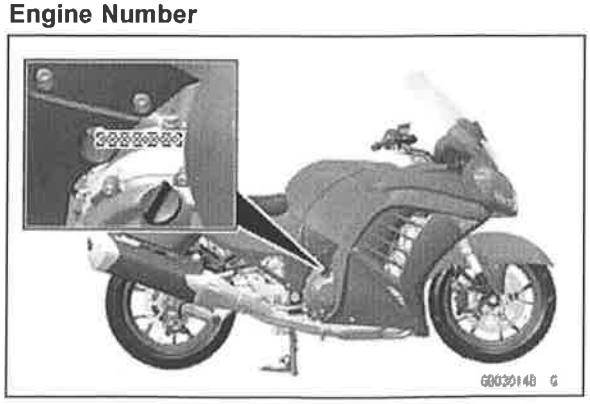
ZG1400EF Right Side View

○The saddlebags at rear side are accessory parts.

Frame Number



Engine Number



General Specifications

Items	ZG1400EF ~ EH
Dimensions	
Overall Length	2 230 mm (87.80 in.)
Overall Width	790 mm (31.10 in.)
(with saddlebags)	1 000 mm (39.37 in.)
Overall Height/High Position	1 345 mm (52.95 in.)/1 465 mm (57.68 in.)
Wheelbase	1 520 mm (59.84 in.)
Road Clearance	125 mm (4.92 in.)
Seat Height	815 mm (32.09 in.)
Curb Mass:	305 kg (673 lb)
(with saddlebags)	313 kg (690 lb)
Front:	147 kg (324 lb)
(with saddlebags)	147 kg (324 lb)
Rear:	158 kg (348 lb)
(with saddlebags)	166 kg (366 lb)
Fuel Tank Capacity	22 L (5.8 US gal.)
Performance	
Minimum Turning Radius	3.2 m (10.5 ft)
Engine	
Type	4-stroke, DOHC, 4-cylinder
Cooling System	Liquid-cooled
Bore and Stroke	84.0 × 61.0 mm (3.3 × 2.4 in.)
Displacement	1 352 cm³ (82.5 cu in.)
Compression Ratio	10.7:1
Maximum Horsepower	114 kW (155 PS) @8 800 r/min (rpm), (WVTA (FULL), GB WVTA (FULL), SEA-B1, Euro 3) 114.0 kW (155 PS) @8 800 r/min (rpm), (WVTA (78.2)) 78.2 kW (106 PS) @8 000 r/min (rpm), (CA, CAL, US) – – –
Maximum Torque	136 N·m (13.9 kgf·m, 100 ft·lb) @6 200 r/min (rpm), (WVTA (FULL), GB WVTA (FULL), SEA-B1, Euro 3) 136.0 N·m (13.9 kgf·m, 100 ft·lb) @6 200 r/min (rpm), (WVTA (78.2)) 121.0 N·m (12.3 kgf·m, 89 ft·lb) @4 500 r/min (rpm), (CA, CAL, US) – – –
Fuel System	FI (Fuel injection), MIKUNI 40EIDW × 4
Fuel Type:	
Minimum Octane Rating:	
Research Octane Number (RON)	95
Antiknock Index (RON + MON)/2	90
Starting System	Electric starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (IC igniter in ECU)
Ignition Timing	10° BTDC @1 100 r/min (rpm) to 36.8° BTDC @3 800 r/min (rpm)
Spark Plug	NGK CR9EIA-9
Cylinder Numbering Method	Left to right, 1-2-3-4

General Specifications

Items	ZG1400EF ~ EH
Firing Order	1-2-4-3
Valve Timing:	
Intake:	
Open	17° BTDC
Close	75° ABDC
Duration	272°
Exhaust:	
Open	52° BBDC
Close	22° ATDC
Duration	254°
Lubrication System	Forced lubrication (wet sump)
Engine Oil:	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	4.7 L (5.0 US qt)
Drive Train	
Primary Reduction System:	
Type	Gear
Reduction Ratio	1.556 (84/54)
Clutch Type	Wet multi disc
Transmission:	
Type	6-speed, constant mesh, return shift
Gear Ratios:	
1st	3.538 (46/13)
2nd	2.412 (41/17)
3rd	1.900 (38/20)
4th	1.545 (34/22)
5th	1.292 (31/24)
6th	1.074 (29/27)
Final Drive System:	
Type	Shaft drive
Reduction Ratio	2.036 (14/22 × 32/10)
Overall Drive Ratio	3.402 @Top gear
Final Gear Case Oil:	
Type	API "GL-5" hypoid gear oil
Viscosity	Above 5°C (41°F): SAE 90 Below 5°C (41°F): SAE 80
Capacity	160 mL (5.41 US oz.)
Frame	
Type	Press backbone
Caster (Rake Angle)	26°
Trail	112 mm (4.4 in.)
Front Tire:	

General Specifications

Items	ZG1400EF ~ EH
Type	Tubeless
Size	120/70ZR17 M/C (58W)
Rim Size	17M/C × MT3.50
Rear Tire:	
Type	Tubeless
Size	190/50ZR17 M/C (73W)
Rim Size	17M/C × MT6.00
Front Suspension:	
Type	Telescopic fork (upside-down)
Wheel Travel	113 mm (4.4 in.)
Rear Suspension:	
Type	Swingarm (uni-trak - tetra lever)
Wheel Travel	136 mm (5.3 in.)
Brake Type:	
Front	Dual discs
Rear	Single disc
Electrical Equipment	
Battery	12 V 14 Ah (10 HR)
Headlight:	
Type	Semi-sealed beam
High Beam	12 V 60 W × 2
Low Beam	12 V 55 W × 2
Brake/Tail Light	LED
Alternator:	
Type	Three-phase AC
Maximum Output	14 V – 41.5 A @5 000 r/min (rpm)

Specifications are subject to change without notice, and may not apply to every country.

Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	× 1 000 000
kilo	k	× 1 000
centi	c	× 0.01
milli	m	× 0.001
micro	μ	× 0.000001

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

L	×	0.2642	=	gal (US)
L	×	0.2200	=	gal (IMP)
L	×	1.057	=	qt (US)
L	×	0.8799	=	qt (IMP)
L	×	2.113	=	pint (US)
L	×	1.816	=	pint (IMP)
mL	×	0.03381	=	oz (US)
mL	×	0.02816	=	oz (IMP)
mL	×	0.06102	=	cu in.

Units of Force:

N	×	0.1020	=	kg
N	×	0.2248	=	lb
kg	×	9.807	=	N
kg	×	2.205	=	lb

Units of Length:

km	×	0.6214	=	mile
m	×	3.281	=	ft
mm	×	0.03937	=	in.

Units of Torque:

N·m	×	0.1020	=	kgf·m
N·m	×	0.7376	=	ft·lb
N·m	×	8.851	=	in·lb
kgf·m	×	9.807	=	N·m
kgf·m	×	7.233	=	ft·lb
kgf·m	×	86.80	=	in·lb

Units of Pressure:

kPa	×	0.01020	=	kgf/cm²
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cmHg
kgf/cm²	×	98.07	=	kPa
kgf/cm²	×	14.22	=	psi
cmHg	×	1.333	=	kPa

Units of Speed:

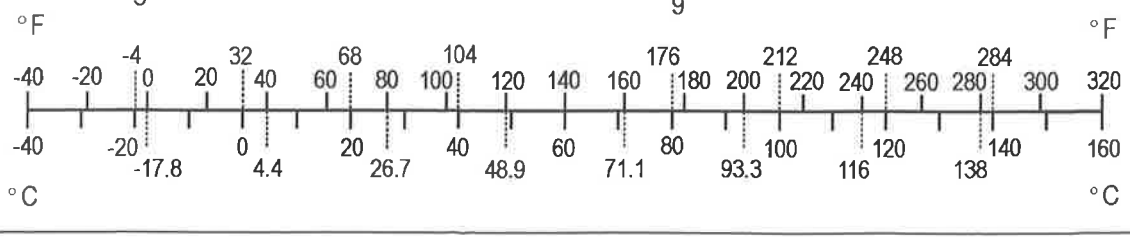
km/h	×	0.6214	=	mph

Units of Power:

kW	×	1.360	=	PS
kW	×	1.341	=	HP
PS	×	0.7355	=	kW
PS	×	0.9863	=	HP

Units of Temperature:

$$\frac{9(°C+40)}{5} - 40 = °F \qquad \frac{5(°F+40)}{9} - 40 = °C$$



Periodic Maintenance

Table of Contents

Periodic Maintenance Chart 2-3
Torque and Locking Agent 2-5
Specifications 2-15
Special Tools and Sealant 2-17
Periodic Maintenance Procedure 2-18
Fuel System (DFI) 2-18
Air Cleaner Element Replacement 2-18
Idle Speed Inspection 2-19
Idle Speed Adjustment 2-20
Throttle Control System Inspection 2-20
Engine Vacuum Synchronization Inspection 2-20
Fuel System Inspection 2-23
Fuel Hose Replacement 2-24
Evaporative Emission Control System Inspection (CAL, CN, SEA-B1 and TH Models) 2-26
Cooling System 2-27
Coolant Level Inspection 2-27
Cooling System Inspection 2-27
Coolant Change 2-27
Water Hose and O-ring Replacement 2-30
Engine Top End 2-30
Valve Clearance Inspection 2-30
Valve Clearance Adjustment 2-32
Air Suction System Damage Inspection 2-34
Clutch 2-34
Clutch System Inspection 2-34
Clutch Operation Inspection 2-35
Clutch Fluid Level Inspection 2-35
Clutch Fluid Change 2-36
Clutch Hose Replacement 2-36
Rubber Parts of Clutch Master Cylinder/Slave Cylinder Replacement 2-38
Engine Lubrication 2-40
Engine Oil Change 2-40
Oil Filter Replacement 2-41
Wheels/Tires 2-42
Air Pressure Inspection 2-42
Wheels and Tires 2-42
Wheel Bearing Damage Inspection 2-43
Final Drive 2-43
Oil Level Inspection 2-43
Final Gear Case Oil Change 2-44
Brakes 2-46
Brake System Inspection 2-46
Brake Operation Inspection 2-47
Brake Fluid Level Inspection 2-47
Brake Fluid Change 2-48
Brake Hose and Pipe Replacement 2-50
Master Cylinder Rubber Parts Replacement 2-52
Caliper Rubber Parts Replacement 2-54
Brake Pad Wear Inspection 2-57
Brake Light Switch Operation Inspection 2-57

Suspension 2-58
Suspension System Inspection 2-58
Steering 2-60
Steering Play Inspection 2-60
Steering Play Adjustment 2-60
Steering Stem Bearing Lubrication 2-61
Electrical System 2-62
Lights and Switches Operation Inspection 2-62
Headlight Aiming Inspection 2-64
Side Stand Switch Operation Inspection 2-65
Engine Stop Switch Operation Inspection 2-66
Spark Plug Replacement 2-67
Others 2-67
Chassis Parts Lubrication 2-67
Bolts, Nuts and Fasteners Tightness Inspection 2-69

Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition. **The initial maintenance is vitally important and must not be neglected.**

Periodic Inspection

*A: Service at number of years shown or indicated odometer reading intervals, whichever comes first.
*B: For higher odometer readings, repeat at the frequency interval established here.
*C: Service more frequently when operating in severe conditions: dusty, wet, muddy, high speed, or frequent starting/stopping.
○: Emission Related Item

Q: Inspection
: Change or Replace
: Lubrication

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	See Page
Fuel System								
○	Air cleaner element (*C)							2-18
○	Idle speed		Q		Q		Q	2-19
○	Throttle control system (play, smooth return, no drag)	Q:1	Q		Q		Q	2-20
○	Engine vacuum synchronization				Q		Q	2-20
	Fuel system	Q:1	Q		Q		Q	2-23
	Fuel hose	:5						2-24
○	Evaporative emission control system (CAL, CN, SEA-B1 and TH Models)		Q	Q	Q	Q	Q	2-26
Cooling System								
	Coolant level		Q		Q		Q	2-27
	Cooling system	Q:1	Q		Q		Q	2-27
	Coolant, water hoses and O-rings	:3	: every 36 000 km (22 500 mile)					2-27, 2-30
Engine Top End								
○	Valve clearance (US and CA Models)						Q	2-30
	Valve clearance (Other than US and CA Models)		Q: every 42 000 km (26 250 mile)					2-30
○	Air suction system				Q		Q	2-34
Clutch								
	Clutch operation (play, engagement, disengagement)		Q		Q		Q	2-35
	Clutch fluid level	Q:1	Q		Q		Q	2-35
	Clutch fluid, hose and pipe	Q:1	Q		Q		Q	2-34
	Clutch fluid	:2						2-36
	Clutch hose/rubber parts of clutch master cylinder and slave cylinder	:4	: every 48 000 km (30 000 mile)					2-36, 2-38

Periodic Maintenance Chart

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	See Page
Engine Lubrication System								
	Engine oil and oil filter (*C)	↻:1	↻		↻		↻	2-40, 2-41
Wheels and Tires								
	Tire air pressure	Q:1			Q		Q	2-42
	Wheels and tires	Q:1			Q		Q	2-42
	Wheel bearing damage	Q:1			Q		Q	2-43
Final Drive								
	Final gear case oil level				Q		Q	2-43
	Final gear case oil		↻		↻		↻	2-44
Brakes								
	Brake system	Q:1	Q		Q		Q	2-46
	Brake operation (effectiveness, play, no drag)	Q:1	Q		Q		Q	2-47
	Brake fluid level	Q:1	Q		Q		Q	2-47
	Brake fluid (front and rear)	↻:2					↻	2-48
	Brake hose	↻:4						2-50
	Rubber parts of brake master cylinder and caliper	↻:4	↻: every 48 000 km (30 000 mile)					2-52, 2-54
	Brake pad wear (*C)			Q	Q	Q	Q	2-57
	Brake light switch operation		Q	Q	Q	Q	Q	2-57
Suspension								
	Suspension system	Q:1			Q		Q	2-58
Steering								
	Steering play	Q:1	Q		Q		Q	2-60
	Steering stem bearings	:2						2-61
Electrical System								
	Electrical system	Q:1			Q		Q	2-62
○	Spark plugs				↻		↻	2-67
Others								
	Chassis parts	:1						2-67
	Condition of bolts, nuts and fasteners		Q		Q		Q	2-69

Torque and Locking Agent

The following tables list the tightening torque for the major fasteners requiring use of a non-permanent locking agent or silicone sealant etc. All of the values are for use with dry solvent - cleaned threads unless otherwise indicated.

Letters used in the "Remarks" column mean:
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease to the threads.
L: Apply a non-permanent locking agent to the threads.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of engine oil and molybdenum disulfide grease in a weight ration is 10 : 1).
R: Replacement Parts
S: Follow the specification tightening sequence.
Si: Apply silicone grease (ex. PBC grease).
SS: Apply silicone sealant.
WL: Apply soap and water solution or rubber lubricant.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System				
Resonator Mounting Bolts	3.9	0.40	35 in·lb	
Front Air Intake Duct Mounting Bolts	3.9	0.40	35 in·lb	
Outside Temperature Sensor Screw	0.50	0.05	4.4 in·lb	
Air Intake Duct Clamp Bolts	6.9	0.70	61 in·lb	
Rear Air Intake Duct Mounting Bolts	9.8	1.0	87 in·lb	L
Intake Air Temperature Sensor Screw	0.50	0.05	4.4 in·lb	
Air Cleaner Cap Bolts	8.0	0.82	71 in·lb	
Air Cleaner Element Holder Screws	6.9	0.70	61 in·lb	
Air Cleaner Element Cover Bolts	9.8	1.0	87 in·lb	
Drain Hose Fitting	20	2.0	15	
Duct Clamp Bolts	2.0	0.20	18 in·lb	
Throttle Case Cover Screw	3.0	0.31	27 in·lb	
Throttle Cable Mounting Screw	4.0	0.41	35 in·lb	
Intake Air Pressure Sensor Bracket Screws	3.5	0.36	31 in·lb	
Delivery Pipe Mounting Screws	5.0	0.51	44 in·lb	
Spark Plugs	13	1.3	115 in·lb	
Camshaft Position Sensor Bolts	9.8	1.0	87 in·lb	
Throttle Body Assy Holder Bolts	9.8	1.0	87 in·lb	S
Throttle Body Assy Holder Clamp Bolts	2.0	0.20	18 in·lb	
Vehicle-down Sensor Bolts	5.9	0.60	52 in·lb	
Vehicle-down Sensor Bracket Bolt	4.0	0.41	35 in·lb	
Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	L
Water Temperature Sensor	12	1.2	106 in·lb	
Speed Sensor Bolt	9.8	1.0	87 in·lb	L
Gear Position Switch Screws	2.9	0.30	26 in·lb	L
Gear Position Switch Lead Clamp Mounting Bolt	9.8	1.0	87 in·lb	
Fuel Tank Bolts	8.0	0.82	71 in·lb	
Fuel Tank Cap Bolts	4.5	0.46	40 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel Level Sensor Bolts	7.0	0.71	62 in·lb	L
Fuel Tank Bracket Bolts	8.0	0.82	71 in·lb	
Fuel Pump Assembly Screws	0.98	0.10	8.7 in·lb	R
Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
Bracket Bolts	8.0	0.82	71 in·lb	
Oxygen Sensors	25	2.5	18	
Canister Bracket Nut	7.0	0.71	62 in·lb	
Cooling System				
Water Hose Clamp Screws	3.0	0.31	27 in·lb	
Radiator Upper Bolts	25	2.5	18	
Coolant Fitting Bolt	8.8	0.90	78 in·lb	L
Thermostat Housing Mounting Bolts	9.8	1.0	87 in·lb	
Thermostat Housing Cover Bolts	5.9	0.60	52 in·lb	
Radiator Lower Bolt	9.8	1.0	87 in·lb	
Radiator Stay Bolt	9.8	1.0	87 in·lb	
Coolant Reserve Tank Bolts	3.9	0.40	35 in·lb	L
Cylinder Fitting Bolts	9.8	1.0	87 in·lb	
Water Pump Cover Bolts	12	1.2	106 in·lb	
Coolant Drain Plug	10	1.0	89 in·lb	
Water Pump Mounting Bolts	12	1.2	106 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Engine Top End				
Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	L
Camshaft Position Sensor Bolts	9.8	1.0	87 in·lb	
Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	S
Cam Sprocket Mounting Bolts	15	1.5	11	L
Variable Valve Actuator Mounting Bolt	59	6.0	44	MO, R
Camshaft Cap Bolts	12	1.2	106 in·lb	S
Cylinder Head Bolts (M11, First)	39	4.0	29	MO, S
Cylinder Head Bolts (M11, Final)	72	7.3	53	MO, S
Throttle Body Assy Holder Bolts	9.8	1.0	87 in·lb	S
Throttle Body Assy Holder Clamp Bolts	2.0	0.20	18 in·lb	
Water Passage Plugs	19.6	2.00	14.5	L
Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
Water Temperature Sensor	12	1.2	106 in·lb	
Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
Engine Bracket Bolts (M8)	25	2.5	18	R, S
Subframe Bolts	23	2.3	17	R
Front Engine Mounting Bolts (M10)	60	6.1	44	R, S
Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
Exhaust Pipe Manifold Holder Nuts	see the text	←	←	S

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Oxygen Sensors	25	2.5	18	
Muffler Body Clamp Bolt	17	1.7	13	
Exhaust Pipe Cover Bolts	9.8	1.0	87 in·lb	
Muffler Body Mounting Bolt (L = 58 mm)	34	3.5	25	
Muffler Body Mounting Bolt (L = 60 mm)	34	3.5	25	
Muffler Body Cover Bolts	10	1.0	89 in·lb	L
Clutch				
Clutch Reservoir Cap Screws	1.5	0.15	13 in·lb	
Clutch Reservoir Bolt	7.8	0.80	69 in·lb	L
Clutch Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si
Clutch Reservoir Screw	1.3	0.13	12 in·lb	L
Clutch Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Clutch Master Cylinder Bleed Valve	5.4	0.55	48 in·lb	
Starter Lockout Switch Screw	0.70	0.07	6.2 in·lb	L
Clutch Master Cylinder Clamp Bolts	10	1.0	89 in·lb	S
Clutch Cover Bolts	9.8	1.0	87 in·lb	L (1), S
Oil Filler Plug	–	–	–	Hand -tighten
Clutch Hose Clamp Bolt	8.0	0.82	71 in·lb	
Clutch Hose Fitting Bolt	8.0	0.82	71 in·lb	
Clutch Pipe Joint Nuts	18	1.8	13	
Clutch Hose Banjo Bolts	25	2.5	18	
Clutch Hub Nut	135	13.8	100	R
Sub Clutch Hub Bolts	25	2.5	18	L
Clutch Spring Bolts	11	1.1	97 in·lb	
Clutch Slave Cylinder Bleed Valve	8.4	0.86	74 in·lb	
Clutch Slave Cylinder Bolts	9.8	1.0	87 in·lb	L
Engine Lubrication System				
Oil Control Solenoid Valve Bolts	9.8	1.0	87 in·lb	
Oil Pipe Bolt (Upper)	9.8	1.0	87 in·lb	
Oil Pump Cover Bolts	9.8	1.0	87 in·lb	
Oil Pipe Bolt (Lower)	9.8	1.0	87 in·lb	L
Oil Cooler Mounting Bolts (ZG1400EF ~ EH)	12	1.2	106 in·lb	S
Oil Cooler Mounting Bolts (ZG1400EH)	12	1.2	106 in·lb	L, S
Oil Filter	17	1.7	13	G, R
Oil Pan Plate Bolts	9.8	1.0	87 in·lb	L
Holder Mounting Bolt	35	3.6	26	L
Oil Pressure Relief Valve	15	1.5	11	L
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
Oil Pressure Switch	15	1.5	11	LG
Oil Pan Bolts	9.8	1.0	87 in·lb	
Engine Oil Drain Bolt	29	3.0	21	
Oil Passage Plug	20	2.0	15	L

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Engine Removal/Installation				
Engine Bracket Bolts (M8)	25	2.5	18	R, S
Subframe Bolts	23	2.3	17	R
Front Engine Mounting Bolts (M10)	60	6.1	44	R, S
Engine Mounting Bolts	15	1.5	11	S
Engine Mounting Nuts (M12)	60	6.1	44	R, S
Crankshaft/Transmission				
Breather Cover Bolts (L = 25 mm)	9.8	1.0	87 in·lb	L
Breather Cover Bolt (L = 35 mm)	9.8	1.0	87 in·lb	
Crankcase Bolts (M7, L = 65 mm)	20	2.0	15	S
Connecting Rod Big End Nuts	see the text	←	←	MO
Piston Oil Jets	2.9	0.30	26 in·lb	
Timing Rotor Bolt	39	4.0	29	
Oil Passage Plugs	20	2.0	15	L
Bearing Position Plate Bolts	10	1.0	89 in·lb	L
Shift Drum Bearing Holder Bolts	10	1.0	89 in·lb	L
Drive Shaft Cover Bolts	25	2.5	18	L
Gear Position Switch Lead Clamp Bolt	9.8	1.0	87 in·lb	
Crankcase Bolts (M7, L = 60 mm)	20	2.0	15	S
Crankcase Bolts (M10, L = 120 mm) (Engine No. ~ ZXT40AE08970)	47	4.8	35	MO, S
Crankcase Bolts (M10, L = 120 mm) (Engine No. ZXT40AE08971 ~)	49	5.0	36	MO, S
Crankcase Bolt (M7, L = 110 mm)	20	2.0	15	S
Crankcase Bolts (M10, L = 90 mm) (Engine No. ~ ZXT40AE08970)	47	4.8	35	MO, S
Crankcase Bolts (M10, L = 90 mm) (Engine No. ZXT40AE08971 ~)	49	5.0	36	MO, S
Crankcase Bolts (M7, L = 45 mm)	20	2.0	15	S
Crankcase Bolt (M7, L = 50 mm)	20	2.0	15	S
Crankcase Bolt (M7, L = 85 mm)	20	2.0	15	S
Crankcase Bolts (M6, L = 40 mm)	12	1.2	106 in·lb	S
Crankcase Bolts (M8, L = 70 mm)	27	2.8	20	S
Crankcase Bolt (M6, L = 50 mm)	12	1.2	106 in·lb	S
Crankcase Bolt (M6, L = 65 mm)	12	1.2	106 in·lb	S
Crankcase Bolts (M8, L = 80 mm)	27	2.8	20	S
Crankcase Bolts (M6, L = 25 mm)	12	1.2	106 in·lb	S
Balancer Shaft Clamp Bolts	9.8	1.0	87 in·lb	
Balancer Shaft Clamp Lever Bolts	25	2.5	18	
Gear Positioning Lever Bolt	12	1.2	106 in·lb	
Starter Clutch Shaft Bolt	9.8	1.0	87 in·lb	L
Starter Clutch Shaft Plate Bolt	9.8	1.0	87 in·lb	L
Shift Shaft Return Spring Pin	29	3.0	21	L

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Shift Drum Cam Holder Bolt	12	1.2	106 in·lb	L
Torque Limiter Bolt	25	2.5	18	L
Gear Position Switch Screws	2.9	0.30	26 in·lb	L
Shift Lever Bolt	8.0	0.82	71 in·lb	
Tie-rod Locknut (Front)	6.9	0.70	61 in·lb	Lh
Tie-rod Locknut (Rear)	6.9	0.70	61 in·lb	
Shift Pedal Mounting Bolt	25	2.5	18	
Wheels/Tires				
Front Axle Clamp Bolts	20	2.0	15	AL
Front Axle Nut	130	13.3	95.9	
Front Tire Pressure Sensor Nut	12	1.2	106 in·lb	
Rear Axle Nut	130	13.3	95.9	
Final Drive				
Damper Cam Nut	210	21.4	155	MO, R
Bearing Retainer Bolts	8.8	0.90	78 in·lb	L
Drive Gear Nut	380	38.7	280	MO, R, S
Oil Nozzles	3.0	0.31	27 in·lb	
Driven Gear Assy Mounting Bolts	25	2.5	18	
Driven Gear Bolt	130	13.3	95.9	MO
Front Gear Case Bolts (L = 95 mm)	29	3.0	21	L (1)
Front Gear Case Bolts (L = 35 mm)	20	2.0	15	L (1)
Front Gear Case Bolts (L = 92 mm)	29	3.0	21	L
Front Gear Case Bolt (L = 50 mm)	20	2.0	15	
Bearing Retainer	540	55.1	398	Lh
Final Gear Case Cover Bolts (M10)	34	3.5	25	L
Adjuster Locknut	40	4.1	30	L
Pinion Gear Assembly Nut	128	13.1	94.4	
Torque Rod Nut	60	6.1	44	R
Lock Pin	16	1.6	12	L
Final Gear Case Cover Bolts (M8)	24	2.4	18	L
Bearing Retainer Bolt	7.0	0.71	62 in·lb	L
Final Gear Case Locknut	100	10.2	73.8	R
Final Gear Case Outer Cover Bolts	9.8	1.0	87 in·lb	
Filler Plug	6.0	0.61	53 in·lb	
Final Gear Case Oil Drain Bolt	17	1.7	13	
Brakes				
Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
Front Wheel Rotation Sensor Bolt	25	2.5	18	
Brake Hose Clamp Bolt	8.0	0.82	71 in·lb	
Brake Hose Joint Bolts	8.0	0.82	71 in·lb	
Brake Hose Banjo Bolts	25	2.5	18	
Brake Hose Joint Bracket Bolts	8.0	0.82	71 in·lb	
Brake Reservoir Screw	1.3	0.13	12 in·lb	L

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Brake Reservoir Bolt	7.8	0.80	69 in·lb	L
Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si
Bleed Valves	8.0	0.82	7.1 in·lb	
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S
Brake Pipe Joint Nuts	18	1.8	13	
Brake Pipe Bracket Bolts	1.0	0.10	8.9 in·lb	
K-ACT ABS Hydraulic Unit Bracket Bolt (L = 35 mm)	7.0	0.71	62 in·lb	
K-ACT ABS Hydraulic Unit Nuts	7.0	0.71	62 in·lb	
K-ACT ABS Hydraulic Unit Bracket Bolt (L = 30 mm)	7.0	0.71	62 in·lb	
Front Brake Disc Mounting Bolts	28	2.9	21	L
Front Brake Pad Pins	17.2	1.75	12.7	
Front Caliper Mounting Bolts	35	3.6	26	
Front Caliper Assembly Bolts	27	2.8	20	L
Rear Brake Reservoir Bracket Bolt	8.0	0.82	71 in·lb	
Rear Brake Reservoir Mounting Bolt	4.0	0.41	35 in·lb	L
Brake Hose Clamp Bolts	8.0	0.82	71 in·lb	
Brake Hose Joint Bolt	8.0	0.82	71 in·lb	
Caliper Bracket Bolt	65	6.6	48	
Rear Wheel Rotation Sensor Bolt	25	2.5	18	
Rear Master Cylinder Mounting Bolts	25	2.5	18	
Rear Brake Spring Bolt	8.0	0.82	35 in·lb	L
Brake Pedal Bolt	9.0	0.92	80 in·lb	L
Rear Master Cylinder Push Rod Locknut	17.2	1.75	12.7	
Bleed Valves	8.0	0.82	71 in·lb	
Rear Caliper Assembly Bolts	37	3.8	27	L
Rear Caliper Mounting Bolts	25	2.5	18	
Rear Brake Pad Pin	17.2	1.75	12.7	
Rear Brake Disc Mounting Bolts	28	2.9	21	L
Suspension				
Front Fork Top Plugs	23	2.3	17	
Front Fork Clamp Bolts (Upper)	20	2.0	15	
Piston Rod Nuts	15	1.5	11	
Front Fork Clamp Bolts (Lower)	30	3.1	22	AL
Front Axle Clamp Bolts	20	2.0	15	AL
Front Fork Bottom Allen Bolts	23	2.3	17	L
Swingarm Pivot Adjusting Collar Locknut	100	10.2	73.8	
Swingarm Pivot Shaft	20	2.0	15	
Rear Shock Absorber Nut (Upper)	45	4.6	33	R
Swingarm Pivot Shaft Nut	110	11.2	81.1	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Spring Preload Adjuster Cable Bracket Bolt	8.0	0.82	71 in·lb	
Spring Preload Adjuster Bolts	8.0	0.82	71 in·lb	
Rear Shock Absorber Nut (Lower)	35	3.6	26	R
Rocker Arm Nut	50	5.1	37	R
Swingarm Pivot Adjusting Collar	20	2.0	15	
Tie-Rod Nuts	60	6.1	44	R
Torque Rod Nuts	60	6.1	44	R
Swingarm Cover Bolt	4.0	0.41	35 in·lb	
Final Gear Case Locknut	100	10.2	73.8	R
Axle Bracket Locknut	100	10.2	73.8	R
Steering				
Handlebar Bolts	35	3.6	26	L
Handlebar Weight Bolts	20	2.0	15	L
Handlebar Holder Bolts	25	2.5	18	S
Front Fork Clamp Bolts (Upper)	20	2.0	15	
Steering Stem Head Bolt	110	11.2	81.1	
Throttle Case Cover Screw	3.0	0.31	27 in·lb	
Right Handlebar Switch Housing Screws	3.5	0.36	31 in·lb	
Left Handlebar Switch Housing Screws	3.5	0.36	31 in·lb	
Steering Stem Nut	30	3.1	22	
Front Fork Clamp Bolts (Lower)	30	3.1	22	AL
Steering Stem Cover Bolt	8.0	0.82	71 in·lb	
Horn Bolts	8.0	0.82	71 in·lb	
Frame				
Front Fuel Tank Cover Bolts	4.0	0.41	35 in·lb	
Battery Case Holder Bolt (L= 22 mm)	4.0	0.41	35 in·lb	
Right Cover Bolt	4.0	0.41	35 in·lb	
Front Footpeg Bracket Bolts	25	2.5	18	
Bank Sensors	8.0	0.82	71 in·lb	L
Front Footpeg Screws	3.0	0.31	27 in·lb	L
Battery Case Holder Bolt (L= 14 mm)	4.0	0.41	35 in·lb	
Side Stand Switch Bolt	9.0	0.92	80 in·lb	L
Side Stand Bracket Bolts	50	5.1	37	L
Breather Pipe Bolt	8.0	0.82	71 in·lb	L
Center Stand Spring Bolt	8.0	0.82	71 in·lb	L
Side Stand Bolt	45	4.6	33	
Side Stand Nut	45	4.6	33	R
Center Stand Bolts	45	4.6	33	
Battery Back Cover Bolts	8.0	0.82	71 in·lb	
Rear Frame Bolts	45	4.6	33	L
Carrier Bracket Bolts (M10)	35	3.6	26	
Carrier Plate Bolts	8.0	0.82	71 in·lb	
Frame Side Bracket Bolts	25	2.5	18	L

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Carrier Bracket Bolts (M8)	25	2.5	18	L
Carrier Bracket Bolts (M5)	0.50	0.05	4.4 in·lb	
Seat Under Plate Bolts	4.0	0.41	35 in·lb	
Hook Bracket Bolts	25	2.5	18	L
Fuel Tank Bracket Bolts	8.0	0.82	71 in·lb	
Seat Lock Latch Bolts	8.0	0.82	71 in·lb	
Rear Footpeg Bracket Bolts	35	3.6	26	
Rear Footpeg Screws	3.0	0.31	27 in·lb	L
Rear Footpeg Bracket Cap Bolt	1.2	0.12	11 in·lb	L
Regulator/Rectifier Bracket Nuts	7.0	0.71	62 in·lb	
Tool Kit Case Bolts	4.0	0.41	35 in·lb	
Vehicle-down Sensor Bracket Bolt	4.0	0.41	35 in·lb	
Front Fender Mounting Bolts (L = 14 mm)	4.0	0.41	35 in·lb	
Front Fender Cover Screws	1.2	0.12	11 in·lb	
Front Fender Bracket Bolts	8.0	0.82	71 in·lb	
Front Fender Mounting Bolts (L = 35 mm)	4.0	0.41	35 in·lb	
Seat Cover Bolts	3.0	0.31	27 in·lb	
Cross Bar Bolts	8.0	0.82	71 in·lb	
Rear Fender Mounting Bolts	1.0	0.10	8.9 in·lb	
Center Seat Cover Bolts	3.0	0.31	27 in·lb	
Lead Cover Bolts	1.0	0.10	8.9 in·lb	
Flap Mounting Nuts	4.0	0.41	35 in·lb	R
Tail Cover Bolts	3.0	0.31	27 in·lb	
Seat Lock Screws	1.2	0.12	11 in·lb	
License Plate Bracket Bolts	4.0	0.41	35 in·lb	
Reflector Nuts	3.0	0.31	27 in·lb	
Carrier Plate Bolts	8.0	0.82	71 in·lb	
Rear View Mirror Bracket Bolts	8.0	0.82	71 in·lb	
Fairing Stay Bolts	7.0	0.71	62 in·lb	
Pad Bracket Bolts	8.0	0.82	71 in·lb	
Upper Fairing Bracket Nuts	25	2.5	18	R
Front Middle Fairing Bolts (M5)	0.50	0.05	4.4 in·lb	
Rear Middle Fairing Bolts (M5)	0.50	0.05	4.4 in·lb	
Rear Middle Fairing Bolt (M6, L = 30 mm)	1.0	0.10	8.9 in·lb	
Front Middle Fairing Bolts (M6)	4.0	0.41	35 in·lb	
Rear Middle Fairing Bolts (M6, L= 14 mm)	4.0	0.41	35 in·lb	
Front Middle Fairing Inner Cover Screws	3.0	0.31	27 in·lb	
Lower Fairing Screws	3.0	0.31	27 in·lb	
Lower Fairing Bolts	4.0	0.41	35 in·lb	
Inner Cover Bolts	0.50	0.05	4.4 in·lb	
Intake Air Duct Fairing Mounting Screws (L = 16 mm)	3.0	0.31	27 in·lb	
Headlight Mounting Screws	3.0	0.31	27 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Intake Air Duct Fairing Mounting Screws (L = 14 mm)	3.0	0.31	27 in·lb	
Electric Windshield Actuator Cover Bolts	3.0	0.31	27 in·lb	
Windshield Cover Bolts (L = 12 mm)	3.0	0.31	27 in·lb	
Windshield Cover Bolts (L = 16 mm)	5.5	0.56	49 in·lb	
Intake Windshield Assembly Bolts (M5)	5.5	0.56	49 in·lb	
Intake Windshield Assembly Bolts (M6)	9.0	0.92	80 in·lb	
Meter Bracket Mounting Bolt	7.0	0.71	62 in·lb	
Rear View Mirror Nuts	8.0	0.82	71 in·lb	
Electrical System				
Electric Windshield Assembly Mounting Bolt (L= 18 mm)	7.0	0.71	62 in·lb	
Electric Windshield Assembly Mounting Bolts (L= 12 mm)	8.0	0.82	71 in·lb	
Meter Unit Mounting Nuts	4.0	0.41	35 in·lb	
Headlight Aiming Adjuster Bracket Screws	1.2	0.12	11 in·lb	
Meter Cover Bolts	8.0	0.82	71 in·lb	
Turn Signal Light Mounting Screws	1.2	0.12	11 in·lb	
Upper Fairing Bolt	4.0	0.41	35 in·lb	
Headlight Bracket Screws	1.2	0.12	11 in·lb	
Headlight Mounting Screws	3.0	0.31	27 in·lb	
Headlight Aiming Cable Bracket Screws	1.5	0.15	13 in·lb	
Headlight Aiming Adjuster Bolts	1.5	0.15	13 in·lb	
Tail/Brake Light Assembly Mounting Bolts	4.0	0.41	35 in·lb	
Tail/Brake Light Mounting Bolts	8.0	0.82	71 in·lb	
Tail/Brake Light Cover Bolts	1.2	0.12	11 in·lb	
Tail/Brake Light Bracket Screws	1.2	0.12	11 in·lb	
License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
License Plate Light Cover Mounting Screws	0.90	0.09	8 in·lb	
Camshaft Position Sensor Bolts	9.8	1.0	87 in·lb	
Spark Plugs	13	1.3	115 in·lb	
Oil Control Solenoid Valve Bolts	9.8	1.0	87 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Fuel Level Sensor Bolts	7.0	0.71	62 in·lb	L
Frame Ground Bolts (L = 16 mm)	7.0	0.71	62 in·lb	
Crankshaft Sensor Cover Bolts	9.8	1.0	87 in·lb	L (1)
Timing Rotor Bolt	39	4.0	29	
Oxygen Sensors	25	2.5	18	
Alternator Rotor Bolt	155	15.8	114	
Stator Coil Bolts	12	1.2	106 in·lb	
Alternator Lead Holding Plate Bolts	7.8	0.80	69 in·lb	L
Alternator Cover Bolts	9.8	1.0	87 in·lb	
Regulator/Rectifier Bracket Nuts	7.0	0.71	62 in·lb	
Regulator/Rectifier Bolts	9.8	1.0	87 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	L
Oil Pressure Switch	15	1.5	11	LG
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
Gear Position Switch Lead Clamp Mounting Bolt	9.8	1.0	87 in·lb	
Gear Position Switch Screws	2.9	0.30	26 in·lb	L
Grip Warmer Temperature Adjustment Dial Screws	1.2	0.12	11 in·lb	
Storage Case Bolt	4.0	0.41	35 in·lb	
Storage Case Lid Screws	1.2	0.12	11 in·lb	
Storage Case Solenoid Screws	1.2	0.12	11 in·lb	
Storage Case Solenoid Cover Screws	3.0	0.31	27 in·lb	
Switch Housing Screws	3.5	0.36	31 in·lb	
Starter Lockout Switch Screw	0.70	0.07	6.2 in·lb	L
Steering Lock Unit Cover Screws	1.2	0.12	11 in·lb	
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Frame Ground Bolt (L = 12 mm)	7.0	0.71	62 in·lb	
Speed Sensor Bolt	9.8	1.0	87 in·lb	L
Connector Bracket Bolt	8.0	0.82	71 in·lb	
Steering Stem Cover Bolts	8.0	0.82	71 in·lb	
Side Stand Switch Bolt	9.0	0.92	80 in·lb	L
Horn Bolts	8.0	0.82	71 in·lb	
Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
Starter Motor Cable Terminal Nut	5.9	0.60	52 in·lb	
Starter Motor Cable Terminal Locknut	6.9	0.70	61 in·lb	
Starter Relay Terminal Bolts	3.9	0.40	35 in·lb	
Starter Motor Through Bolts	3.4	0.35	30 in·lb	

The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

Basic Torque for General Fasteners

Threads diameter (mm)	Torque		
	N·m	kgf·m	ft·lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in·lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in·lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23.0	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

Specifications

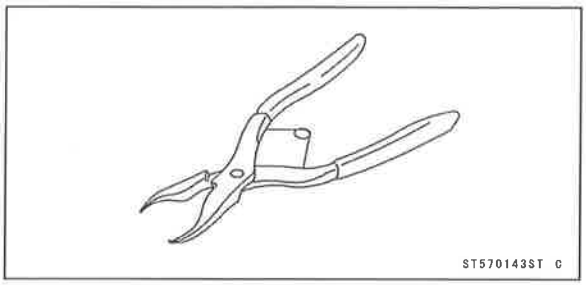
Item	Standard	Service Limit
Fuel System		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Idle Speed	1 100 ± 50 r/min (rpm)	– – –
Throttle Body Vacuum	27.3 ± 1.3 kPa (205 ± 10 mmHg) at idle speed	– – –
Air Cleaner Element	Viscous paper element	– – –
Cooling System		
Coolant:		
Type (Recommended)	Permanent type of antifreeze	– – –
Color	Green	– – –
Mixed Ratio	Soft water 50%, coolant 50%	– – –
Freezing Point	-35°C (-31°F)	– – –
Total Amount	3.4 L (3.6 US qt)	– – –
Engine Top End		
Valve Clearance:		
Exhaust	0.19 ~ 0.24 mm (0.0075 ~ 0.0094 in.)	– – –
Intake	0.12 ~ 0.17 mm (0.0047 ~ 0.0067 in.)	– – –
Clutch		
Clutch Fluid:		
Grade	DOT4	– – –
Clutch Lever Free Play	Non-adjustable	– – –
Engine Lubrication System		
Engine Oil:		
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2	– – –
Viscosity	SAE 10W-40	– – –
Capacity	4.0 L (4.2 US qt) (When filter is not removed.)	– – –
	4.4 L (4.7 US qt) (When filter is removed.)	– – –
	4.7 L (5.0 US qt) (When engine is completely dry.)	– – –
Level	Between upper and lower level lines (Wait several minutes after idling or running)	– – –
Wheels/Tires		
Tread Depth:		
Front	4.8 mm (0.19 in.)	1 mm (0.04 in.), (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	6.2 mm (0.24 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)
Air Pressure (when Cold):		
Front	290 kPa (2.90 kgf/c, 42 psi)	– – –
Rear	290 kPa (2.90 kgf/c, 42 psi)	– – –

Specifications

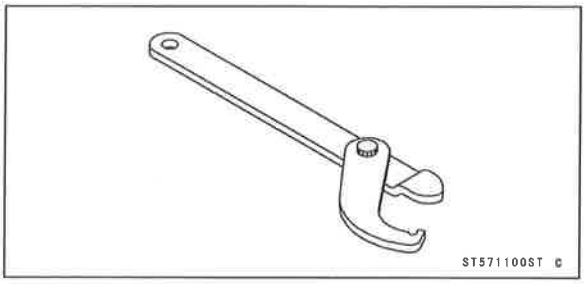
Item	Standard	Service Limit
Final Drive		
Final Gear Case Oil	Hypoid gear oil	– – –
Grade	API Service Classification: GL-5	– – –
Viscosity	When above 5°C (41°F): SAE 90 When below 5°C (41°F): SAE 80	– – – – – –
Oil Level	Bottom of filler opening	– – –
Amount	About 160 mL (5.41 US oz.)	– – –
Brakes		
Brake Fluid:		
Grade	DOT4	– – –
Brake Pad Lining Thickness:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	5.0 mm (0.20 in.)	1 mm (0.04 in.)
Brake Light Timing:		
Front	Pulled ON	– – –
Rear	ON after about 10 mm (0.39 in.) of pedal travel	– – –
Electrical System		
Spark Plug:		
Type	NGK CR9EIA-9	– – –
Gap	0.8 ~ 0.9 mm (0.031 ~ 0.035 in.)	– – –

Special Tools and Sealant

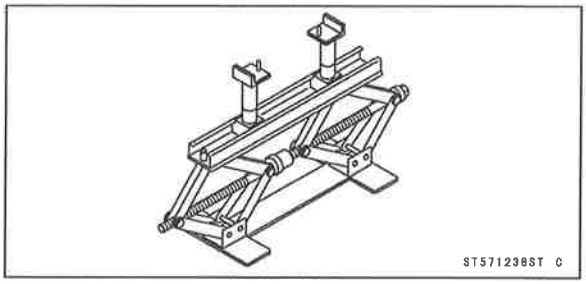
Inside Circlip Pliers:
57001-143



Steering Stem Nut Wrench:
57001-1100



Jack:
57001-1238



Oil Filter Wrench:
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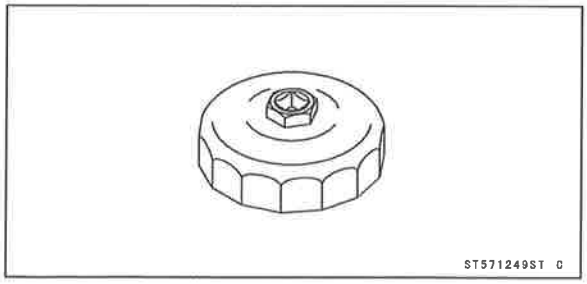
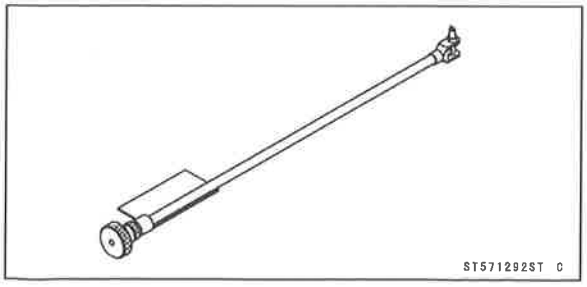


Pilot Screw Adjuster, C:
57001-1292



Vacuum Gauge:
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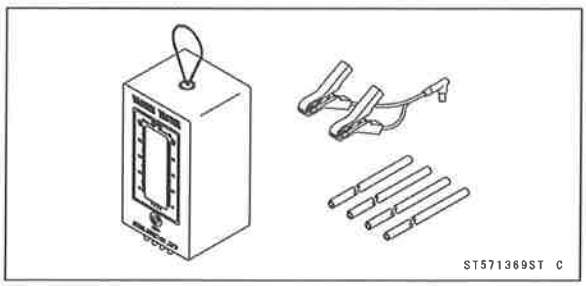
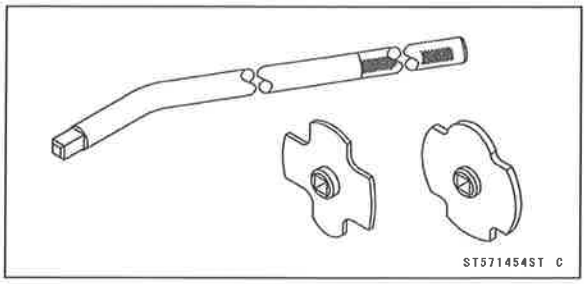
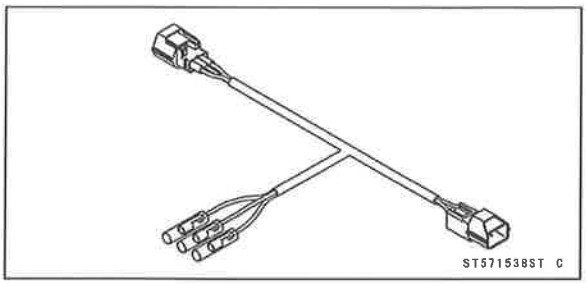


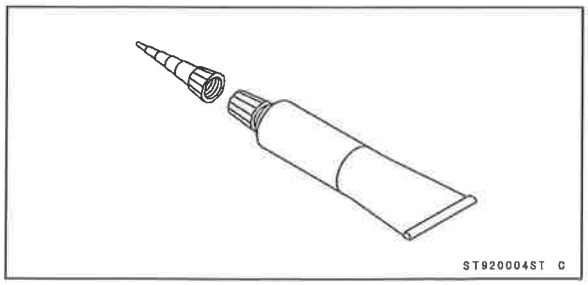
Filler Cap Driver:
57001-1454



Throttle Sensor Setting Adapter:
57001-1538



Liquid Gasket, TB1211F:
92104-0004



Periodic Maintenance Procedure

Fuel System (DFI)

Air Cleaner Element Replacement

NOTE

○*In dusty areas, the element should be replaced more frequently than the recommended interval.*

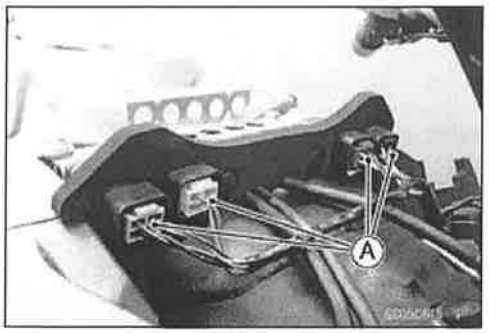
⚠ WARNING

If dirt or dust is allowed to pass through into the throttle body assy, the throttle may become stuck, possibly causing accident. Replace the air cleaner element according to the maintenance chart.

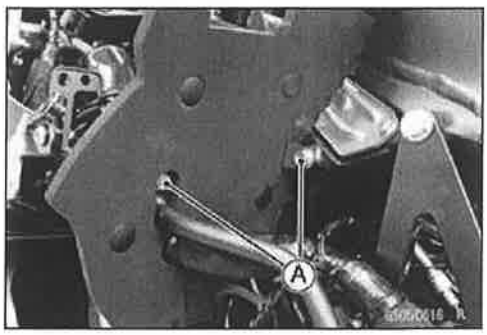
NOTICE

If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

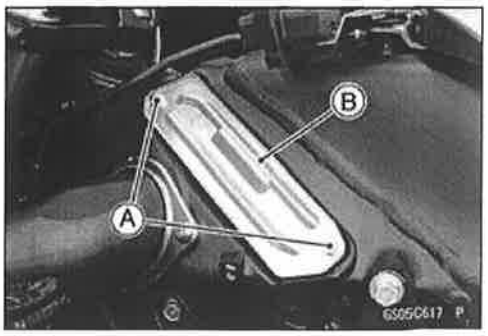
- Remove:
  Left Rear Middle Fairing (see Rear Middle Fairing Removal in the Frame chapter)
- Disconnect:
  Connectors [A]



- Remove the bolts [A].

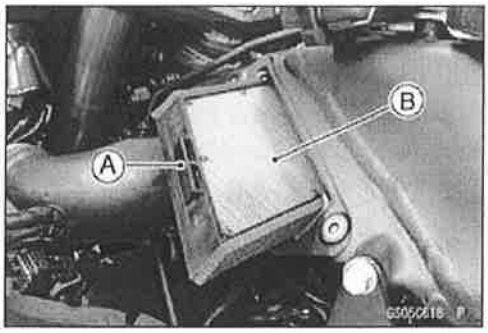


- Remove:
  Air Cleaner Element Cover Bolts [A]
  Air Cleaner Element Cover [B]

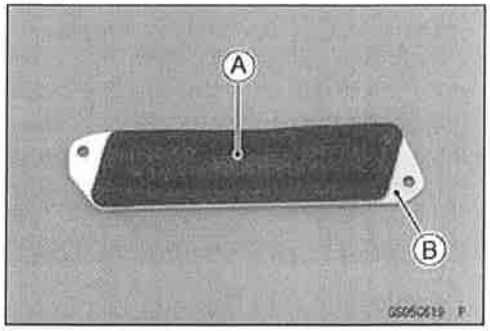


Periodic Maintenance Procedure

- Pull out the air cleaner element.
- Install a new element [A] so that screen side [B] faces upward.



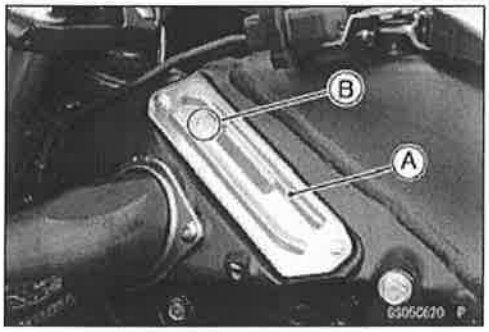
- Check that the seal [A] is in place on the air cleaner element cover [B].



- Install the air cleaner element cover [A] so that arrow mark [B] faces forward.
- Tighten:

Torque - Air Cleaner Element Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removes parts (see appropriate chapter).



Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides [A].

★If handlebar movement changes the idle speed, the throttle cables may be improperly adjusted or incorrectly routed, or damaged. Be sure to correct any of these conditions before riding (see Throttle Control System Inspection and Cable, Wire, and Hose Routing section in the Appendix chapter).

⚠ WARNING

Operation with improperly adjusted, incorrectly routed or damaged cables could result in an unsafe riding condition. Follow the service manual to be make sure to correct any of these conditions.

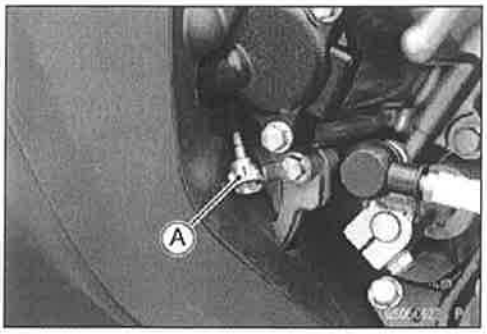
- Check the idle speed.

★If the idle speed is out of specified range, adjust it.

Idle Speed
Standard: 1 100 ±50 r/min (rpm)

Periodic Maintenance Procedure

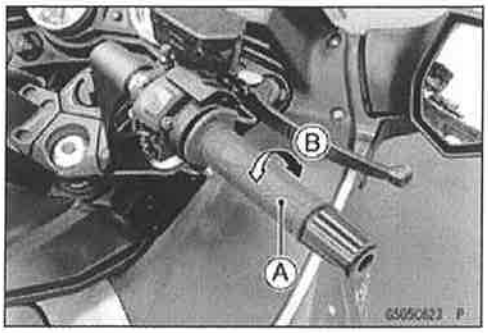
Idle Speed Adjustment



- Start the engine and warm it up thoroughly.
- Turn the adjusting screw [A] until the idle speed is correct.

○Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.

Throttle Control System Inspection

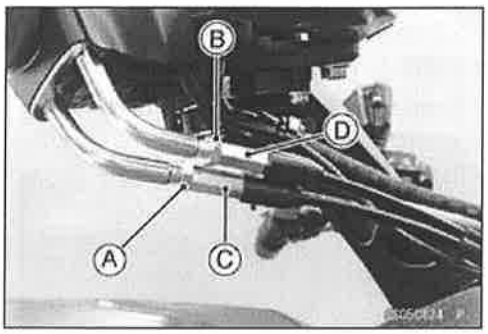


- Check that the throttle grip [A] moves smoothly from full open to close, and the throttle closes quickly and completely by the return spring in all steering positions.

★If the throttle grip does not return properly, check the throttle cables routing, grip free play, and cable damage. Then lubricate the throttle cable.

- Check the throttle grip free play [B].

Throttle Grip Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)



★If the free play is incorrect, adjust the throttle cable as follows.

- Slide the dust covers.
- Loosen the locknuts [A] [B].
- Screw both throttle cable adjusters [C] [D] to give the throttle grip plenty of play.
- Turn the decelerator cable adjuster [C] until there is no play when the throttle grip play completely closed.
- Tighten the locknut [A].
- Turn the accelerator cable adjuster [D] until 2 ~ 3 mm (0.08 ~ 0.12 in.) of throttle grip play is obtained.
- Tighten the locknut [B].

★If the free play can not be adjusted with the adjusters, replace the cable.

Engine Vacuum Synchronization Inspection

NOTE

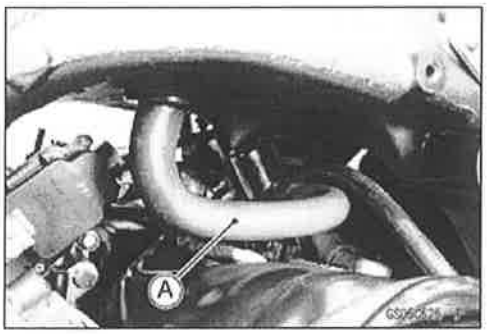
○*These procedures are explained on the assumption that the intake and exhaust systems of the engine are in good condition.*

- Situate the motorcycle so that it is vertical.
- Remove:

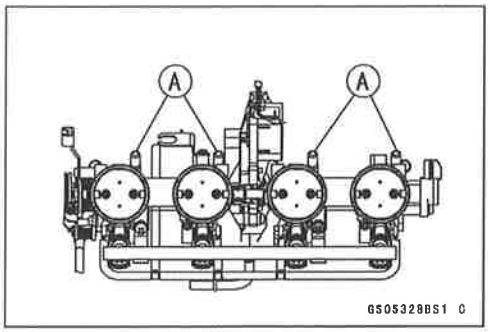
Subframes (see Left/Right Subframe Removal in the Frame chapter)

Periodic Maintenance Procedure

- Disconnect the air switching valve hose [A] from the frame.
- Plug the air switching valve hose end and frame hole.



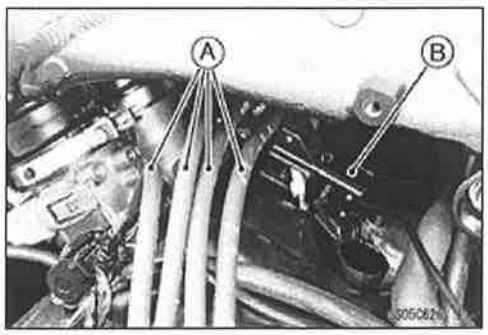
- Pull off the rubber caps [A] from the fittings of each throttle body assy.
- For CAL, CN, SEA-B1 and TH models, pull off the vacuum hoses from the throttle body assy.



- Connect a vacuum gauge and hoses [A] (Special Tool: 57001-1369) to the fittings on the throttle body assy.

  Special Tool - Vacuum Gauge: 57001-1369

- Connect a highly accurate tachometer lead [B] to one of the stick coil primary leads.



- Start the engine and warm it up thoroughly.
- Check the idle speed, using a highly accurate tachometer [A].

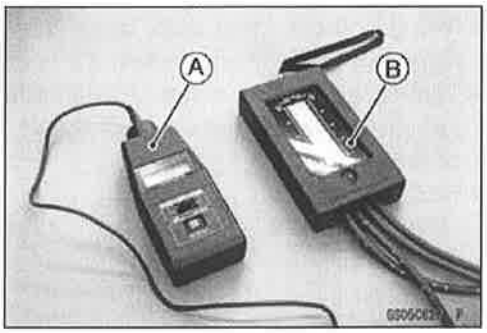
  Idle Speed
  Standard: 1 100 ±50 r/min (rpm)

★If the idle speed is out of the specified range, adjust it with the adjust screw (see Idle Speed Adjustment).

NOTICE
Do not measure the idle speed by the tachometer of the meter unit.

- While idling the engine, inspect the throttle body vacuum, using the vacuum gauge [B].

  Throttle Body Vacuum
  Standard: 27.3 ±13 kPa (205 ±10 mmHg) at idle speed

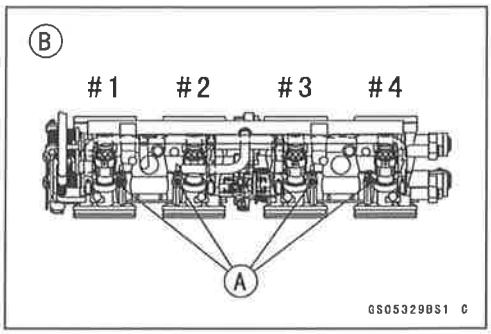


Periodic Maintenance Procedure

★If any vacuum is not within specifications, adjust the bypass screws [A].
View from Rear [B]

Special Tool - Pilot Screw Adjuster, C [C]: 57001-1292

- Adjust the each vacuum (#1 ~ #4) to the standard value.
- Open and close the throttle valves after each measurement.



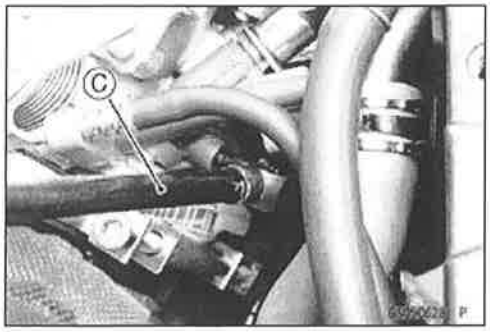
NOTE

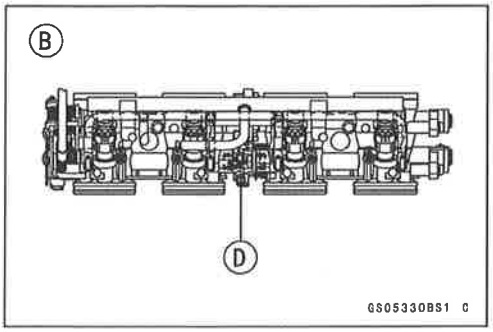
○Do not turn the center adjusting screw [D].

- Check the vacuums as before.

★If all vacuums are within the specification range, finish the engine vacuum synchronization.

★If any vacuum can not be adjusted within the specification, replace the bypass screws #1 ~ #4 with new ones, refer to the following procedure.

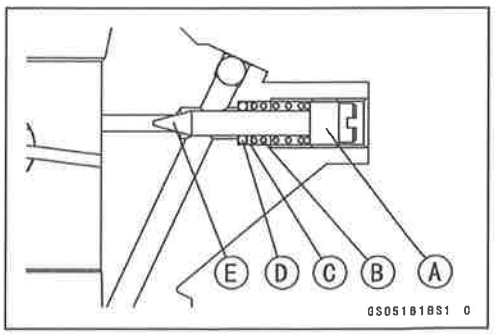




- Remove the throttle body assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).
- Turn in the bypass screw [A] with counting the number of turns until it seals fully but not tightly. Record the number of turns.
- Remove:
  Bypass Screw
  Spring [B]
  Washer [C]
  O-ring [D]
- Check the bypass screw hole in the throttle body assy for carbon deposits.

★If any carbons accumulate, wipe the carbons off from the hole, using a cotton pad penetrated with a high flash-point solvent.

- Replace the bypass screw, spring, washer and O-ring as a set.
- Turn in the bypass screw until it seats fully but not tightly.



NOTICE
Do not over-tighten the bypass screw. The tapered portion [E] of the bypass screw could be damaged.

Periodic Maintenance Procedure

- Back out the same number of turns counted when first turned in. This is to set the screw to its original position.

NOTE

○*A throttle body assy has different "turns out" of the bypass screw for each individual unit. On setting the bypass screw, use the "turns out" determined during disassembly.*

- Repeat the same procedure for other bypass screws.
- Repeat the synchronization.

★If the vacuums are correct, check the output voltage of the main throttle sensor (see Main Throttle Sensor Output Voltage Inspection in the Self-Diagnosis System chapter).

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Main Throttle Sensor Output Voltage
Connections to Adapter:
Meter (+) → R lead (Sensor Y/W)
Meter (–) → BK lead (Sensor BR/BK)

Standard: DC 0.52 ~ 0.72 V at idle throttle opening

★If the output voltage is out of the standard, check the input voltage of the main throttle sensor (see Main Throttle Sensor Input Voltage Inspection in the Self-Diagnosis System chapter).

- Remove the vacuum gauge hoses and install the rubber caps on the original position.
- For the CAL, CN, SEA-B1 and TH models, install the vacuum hoses.

○Run the vacuum hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.

- Install the remove parts (see appropriate chapters).

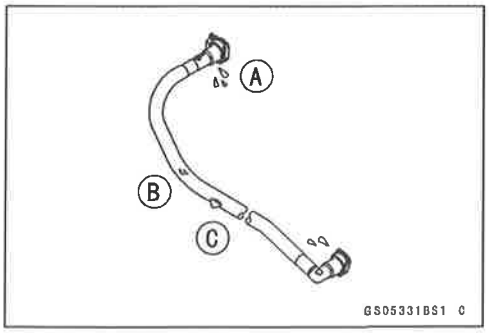
Fuel System Inspection

Fuel Hose Inspection (fuel leak, damage, installation condition)

○If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak [A] or the hose to burst.

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Left Subframe (see Left Subframe Removal in the Frame chapter)
- Check the fuel hose.

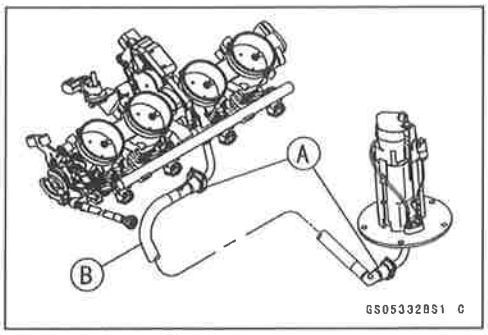
★Replace the fuel hose if any fraying, cracks [B] or bulges [C] are noticed.



Periodic Maintenance Procedure

- Check that the fuel hose is routed according to Cable, Wire, and Hose Routing section in the Appendix chapter.

★Replace the hose if it has been sharply bent or kinked.
Hose Joints [A]
Fuel Hose [B]

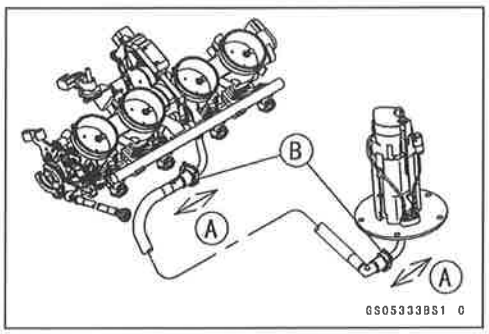


- Check that the hose joints are securely connected.

○Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked.

⚠ WARNING

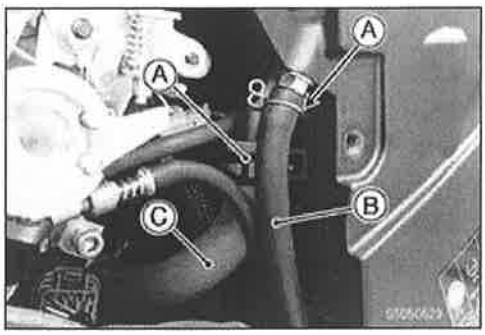
Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint.



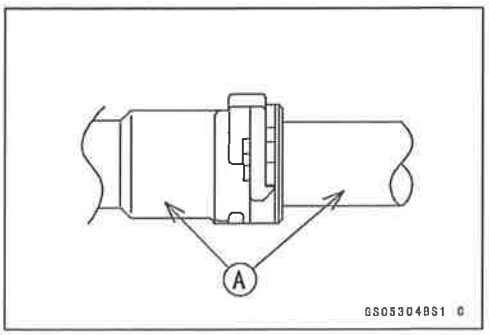
★If it does not locked, reinstall the fuel hose joint.

Fuel Hose Replacement

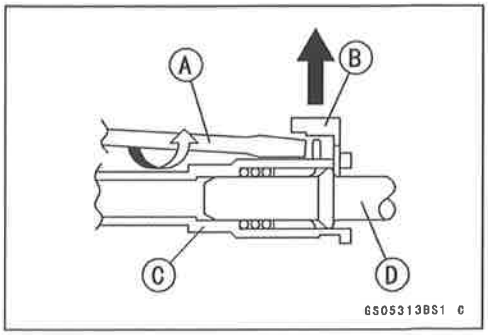
- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Left Subframe (see Left Subframe Removal in the Frame chapter)
- Slide the clamps [A].
- Disconnect:
  Air Cleaner Drain Hose [B]
  Breather Hose [C]



- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.

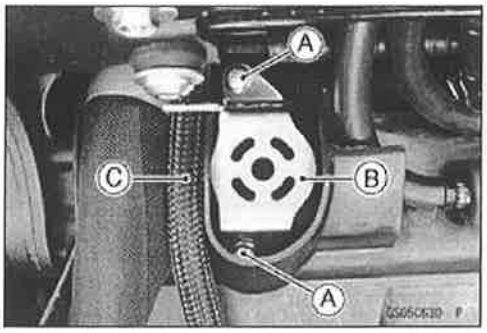


- Insert the flat tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.
- Pull the fuel hose joint [C] out of the delivery pipe [D].



Periodic Maintenance Procedure

- Remove:
  Bracket Bolts [A]
  Bracket [B]
- Pull out the fuel hose [C] to forward.

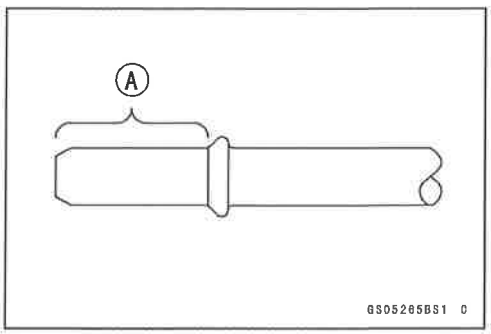


⚠ WARNING

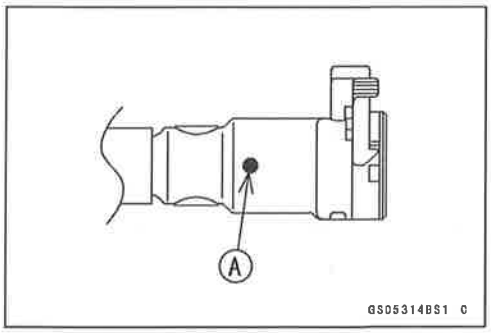
Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe. Cover the hose connection with a clean shop towel to prevent fuel spillage.

- Clean the delivery pipe.
- Cover the delivery pipe with the vinyl bag to keep it clean.

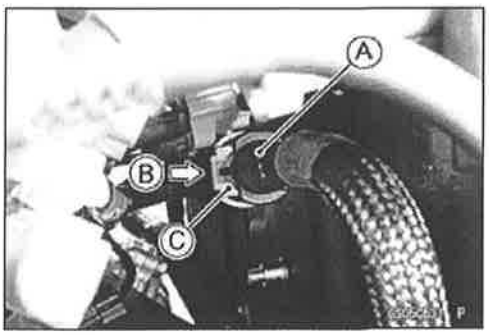
- Remove the vinyl bag on the pipe.
- Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].



- Replace the fuel hose with a new one.
- Install the fuel hose so that the white mark [A] side faces upward.
- Run the fuel hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

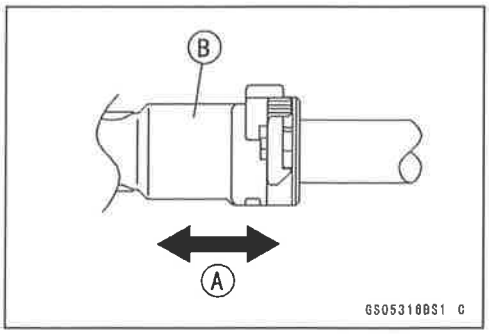


- Insert the fuel hose joint [A] straight onto the delivery pipe until the hose joint clicks.
- Push [B] the joint lock [C].



Periodic Maintenance Procedure

- Push and pull [A] the fuel hose joint [B] back and forth more than two times and make sure it is locked and does not come off.



⚠ WARNING

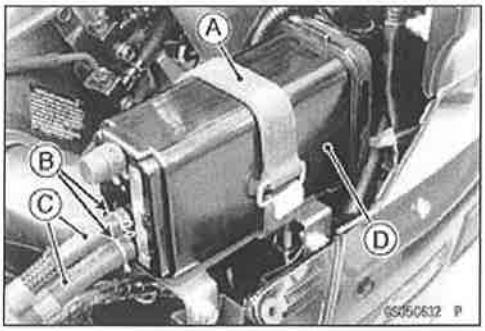
Leaking fuel can cause a fire or explosion resulting in severe burns. Make sure the fuel hose joint is installed correctly on the delivery pipe and that it doesn't leak.

★If it comes off, reinstall the hose joint.
- Install the removed parts (see appropriate chapters).
- Start the engine and check the fuel hose for leaks.

Evaporative Emission Control System Inspection (CAL, CN, SEA-B1 and TH Models)

- Inspect the canister as follows.
- Remove:
  Right Rear Middle Fairing (see Rear Middle Fairing Removal in the Frame chapter)
  Band [A]
- Slide the clamps [B].
- Disconnect the hoses [C] from the canister [D].
- Visually inspect the canister for cracks or other damage.

★If the canister has any cracks or bad damage, replace it with a new one.



NOTE

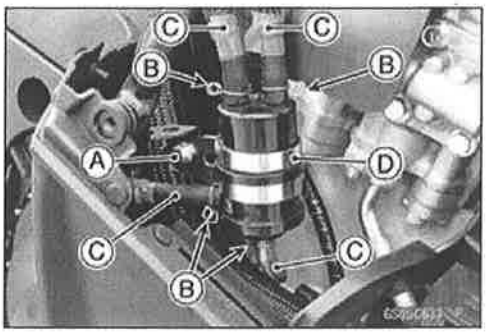
○*The canister is designed to work well through the motorcycle's life without any maintenance if it is used under normal conditions.*

- Inspect the liquid/vapor separator as follows.
- Remove the bolt [A].
- Slide the clamps [B].
- Disconnect the hoses [C] from the separator [D].
- Visually inspect the separator for cracks and other damage.

★If the separator has any cracks or damage, replace it with a new one.

○To prevent the gasoline from flowing into or out of the canister, hold the separator perpendicular to the ground.
- Check the hoses of the evaporative emission control system as follows.

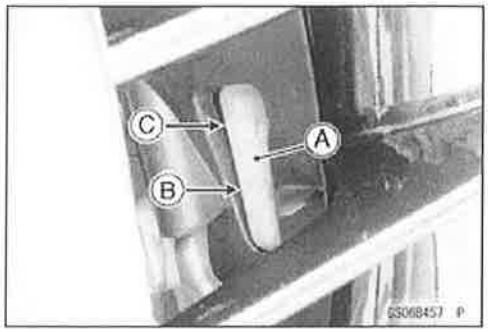
○Check that the hoses are securely connected and clips are in position.
○Replace any kinked, deteriorated or damaged hoses.
○Run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
○When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and run the hoses with a minimum of bending so that the emission flow will not be obstructed.



Periodic Maintenance Procedure

Cooling System

Coolant Level Inspection



NOTE

○*Check the level when the engine is cold (room or ambient temperature).*

- Check the coolant level in the reserve tank [A] with the motorcycle held perpendicular (Do not use the sidestand).

★If the coolant level is lower than the "L" level line [B], unscrew the reserve tank cap and add coolant to the "F" level line [C].

"L": Low

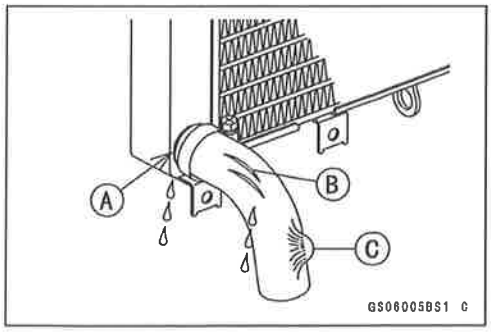
"F": Full

NOTICE

For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water alone can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.
If coolant must be added often or the reserve tank has run completely dry, there is probably leakage in the cooling system. Check the system for leaks.
Coolant ruins painted surfaces. Immediately wash away any coolant that spills on the frame, engine, wheels or other painted parts.

Cooling System Inspection

Water Hose Inspection (coolant leak, damage, installation condition)



○The high pressure inside the water hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained.

- Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.

★Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.

- Check that the hoses are securely connected and clamps are tightened correctly.

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

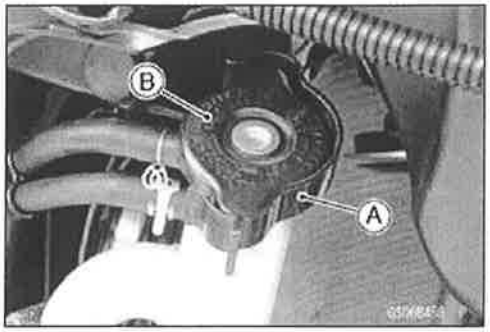
Coolant Change

⚠ WARNING

Coolant can be extremely hot and cause severe burns, is toxic and very slippery. Do not remove the radiator cap or attempt to change the coolant when the engine is hot; allow it cool completely. Immediately wipe any spilled coolant from tires, frame, engine or other painted parts. Do not ingest coolant.

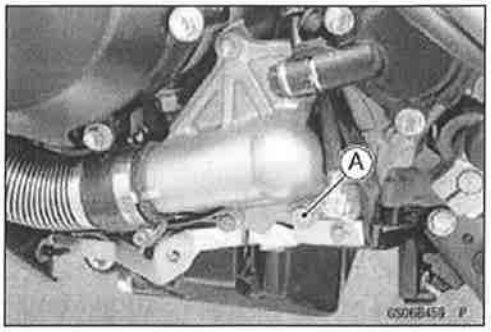
Periodic Maintenance Procedure

- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Left Rear Middle Fairing (see Rear Middle Fairing Removal in the Frame chapter)
  Right Front Middle Fairing (see Front Middle Fairing Removal in the Frame chapter)
  Radiator Cap Cover [A]
  Radiator Cap [B]

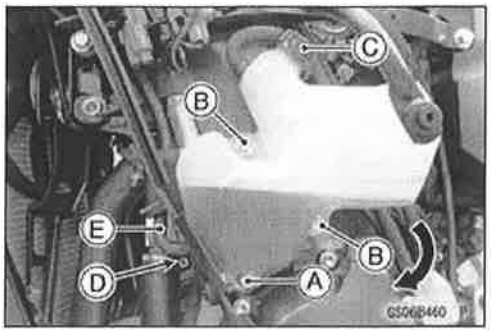


○Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.

- Place a container under the drain plug [A] at the bottom of the water pump cover.
- Drain the coolant from the radiator and engine by removing the drain plug.



- Remove:
  Bolt [A]
  Coolant Reserve Tank Bolts [B]
  Cap [C]
- Turn the coolant reserve tank clockwise.
- Slide the clamp [D] and disconnect the radiator overflow hose [E].
- Pour the coolant into a container.



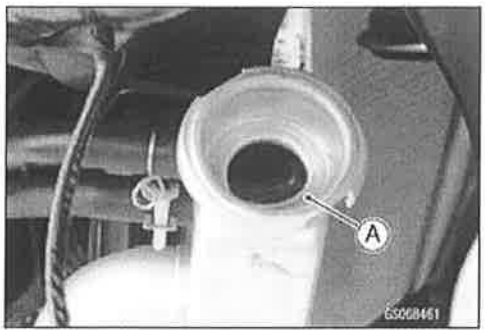
- Install the coolant reserve tank.
- Apply a non-permanent locking agent to the threads of the reserve tank bolts and tighten them.

Torque - Coolant Reserve Tank Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)

- Connect the overflow hose.
- Replace the drain plug gasket with a new one.
- Tighten the drain plug with the drain plug gasket.

Torque - Coolant Drain Plug: 10 N·m (1.0 kgf·m, 89 in·lb)

Periodic Maintenance Procedure



- Fill the radiator up to the radiator filler neck [A] with coolant, and install the radiator cap and radiator cap cover.

NOTE

○*Pour in the coolant slowly so that it can expel the air from the engine and radiator.*

- Fill the reserve tank up to the "F" level line with coolant, and install the cap (see Coolant Level Inspection).

NOTICE

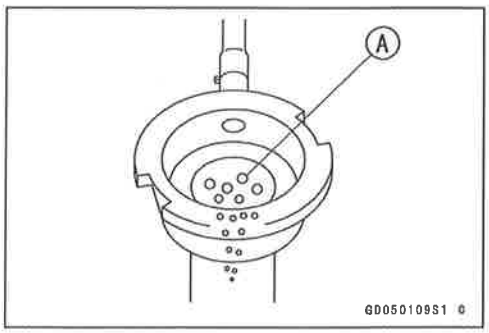
Soft or distilled water must be used with the antifreeze (see below for antifreeze) in the cooling system.
If hard water is used in the system, it causes scales accumulation in the water passages, and considerably reduces the efficiency of the cooling system.

Water and Coolant Mixture Ratio (Recommended)

Soft Water:	**50%**
Coolant:	**50%**
Freezing Point:	**–35°C (–31°F)**
Total Amount:	**3.4 L (3.6 US qt)**

NOTE

○*Choose a suitable mixture ratio by referring to the coolant manufacturer's directions.*



- Bleed the air from the cooling system as follows.

○Start the engine with the radiator cap removed and run it until no more air bubbles [A] can be seen in the coolant.
○Tap the radiator hoses to force any air bubbles caught inside.
○Stop the engine and add coolant up to the radiator filler neck.

- Install the radiator cap and radiator cap cover.
- Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
- Check the coolant level in the reserve tank after the engine cools down.

★If the coolant level is lower than the "L" level line, add coolant to the "F" level line (see Coolant Level Inspection).

NOTICE

Do not add more coolant above the "F" level line.

Periodic Maintenance Procedure

Water Hose and O-ring Replacement

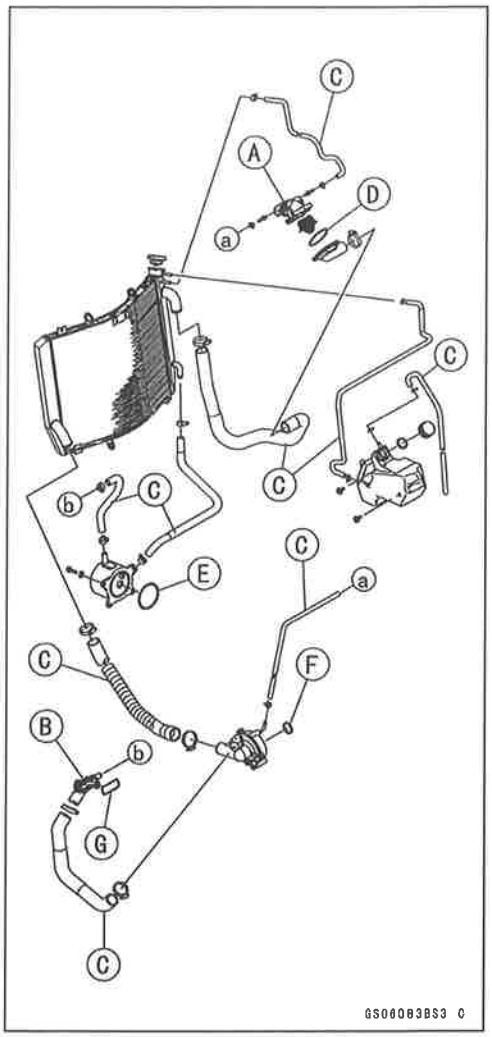
- Drain the coolant (see Coolant Change).
- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Front Middle Fairings (see Front Middle Fairing Removal in the Frame chapter)
  Oil Cooler (see Oil Cooler Removal in the Engine Lubrication System chapter)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Thermostat Housing [A]
  Fitting [B]
  Hoses [C]
  O-rings [D] [E] [F] [G]
- Replace the O-rings with new ones.
- Apply grease to the O-rings [D] [E].
- Apply soap and water solution to the O-ring [F].
- Apply liquid gasket to the O-ring [G].

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Instal the new hoses and tighten the clamps securely.

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the removed parts (see appropriate chapters).
- Fill the coolant (see Coolant Change).
- Check the cooling system for leaks.



Engine Top End

Valve Clearance Inspection

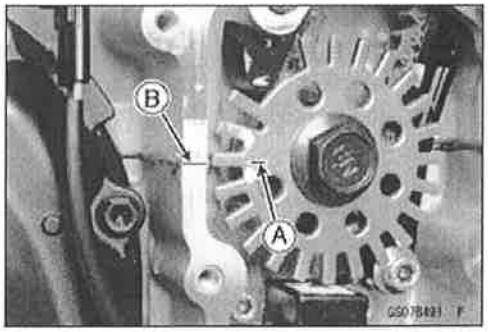
NOTE

○*Valve clearance must be checked and adjusted when the engine is cold (at room temperature).*

- Remove:
  Crankshaft Sensor Cover (see Crankshaft Sensor Removal in the Electrical System chapter)
  Cylinder Head Cover (see Cylinder Head Cover Removal in the Engine Top End chapter)

Periodic Maintenance Procedure

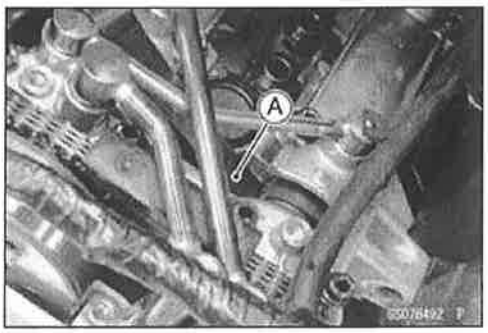
● Position the crankshaft at 1, 4 piston TDC.
TDC Mark [A] for #1, 4 Pistons
Timing Mark [B] (crankcase halves mating surface)



● Using a thickness gauge [A], measure the valve clearance between the cam and the valve lifter.

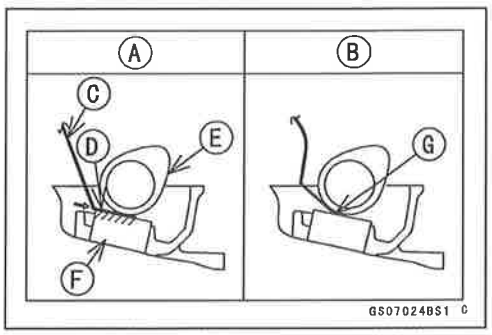
Valve Clearance
Standard:

Exhaust	**0.19 ~ 0.24 mm (0.0075 ~ 0.0094 in.)**
Intake	**0.12 ~ 0.17 mm (0.0047 ~ 0.0067 in.)**



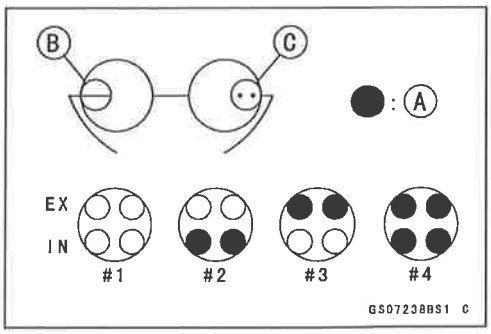
NOTE

○*Thickness gauge is horizontally inserted on the valve lifter.*

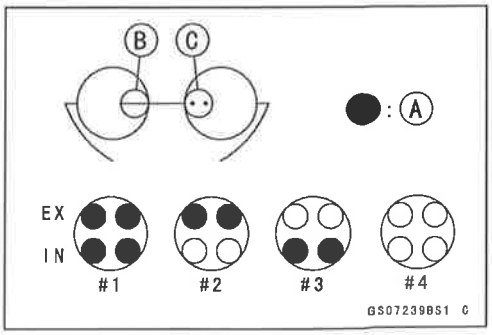


Appropriateness [A]
Inadequacy [B]
Thickness Gauge [C]
Horizontally Inserts [D]
Cam [E]
Valve Lifter [F]
Hits the Valve Lifter Ahead [G]

○**When positioning #1 piston TDC at the end of the compression stroke:**
Intake Valve Clearance of #2 and #4 Cylinders
Exhaust Valve Clearance of #3 and #4 Cylinders
Measuring Valve [A]
Timing Mark (Intake Camshaft) [B]
Punch Marks (Exhaust Camshaft) [C]



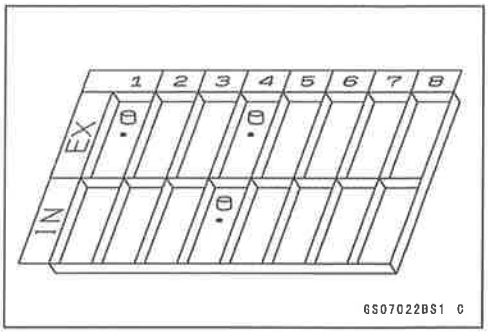
○**When positioning #4 piston TDC at the end of the compression stroke:**
Intake Valve Clearance of #1 and #3 Cylinders
Exhaust Valve Clearance of #1 and #2 Cylinders
Measuring Valve [A]
Timing Mark (Intake Camshaft) [B]
Punch Marks (Exhaust Camshaft) [C]



★If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

Periodic Maintenance Procedure

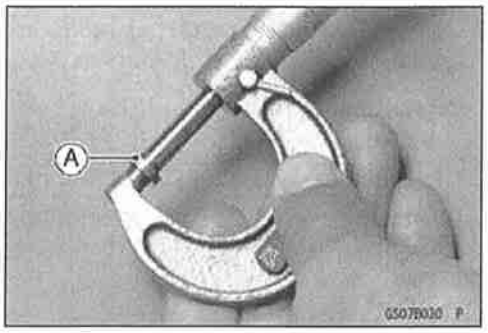
Valve Clearance Adjustment



- To change the valve clearance, remove the camshaft chain tensioner, camshafts and valve lifters. Replace the shim with one of a different thickness.

NOTE

○*Mark and record the locations of the valve lifters and shims so that they can be reinstalled in their original positions.*



- Clean the shim to remove any dust or oil.
- Measure the thickness of the removed shim [A].
- Select a new shim thickness calculation as follows.

  a + b – c = d

  [a] Present Shim Thickness

  [b] Measured Valve Clearance

  [c] Specified Valve Clearance (Mean Value = 0.215 mm (Exhaust), 0.145 mm (Intake))

  [d] Replace Shim Thickness

Example (Intake):

2.300 + 0.31 – 0.145 = 2.465 mm

○Exchange the shim for the 2.475 size shim.

NOTICE

Don't use the shims for another models. This could cause wear of the valve stem end, and valve stem damage.

NOTICE

Be sure to remeasure the clearance after selecting a shim according to the table. If the clearance is out of the specified rage, use the additional shim.

○If there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.

- When installing the shim, face the marked side toward the valve lifter. At this time, apply engine oil to the shim or the valve lifter to keep the shim in place during camshaft installation.

NOTICE

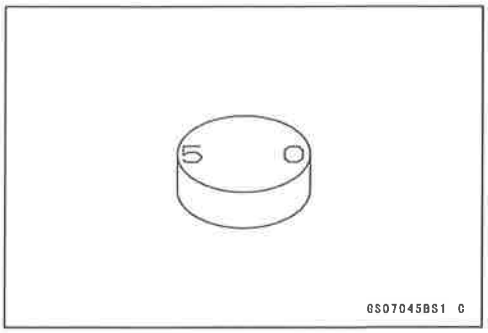
Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage.
Do not grind the shim. This may cause it to fracture, causing extensive engine damage.

- Apply engine oil to the valve lifter surface and install the lifter.
- Install the camshaft (see Camshaft Installation in the Engine Top End chapter).
- Recheck the valve clearance and readjust if necessary.
- Install the removed parts (see appropriate chapters).

Periodic Maintenance Procedure

Adjustment Shims

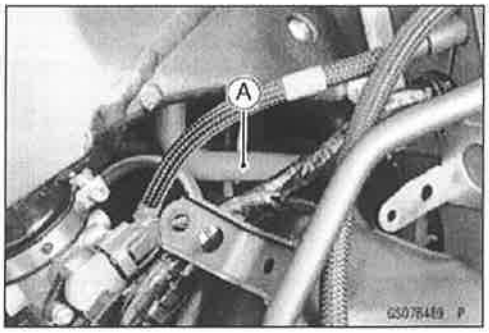
Thickness	Part Number	Mark
1.750	92180-1212	–25
1.775	92180-0221	–23
1.800	92180-1211	–20
1.825	92180-0222	–18
1.850	92180-1210	–15
1.875	92180-0223	–13
1.900	92180-1209	–10
1.925	92180-0224	–8
1.950	92180-1208	–5
1.975	92180-0225	–3
2.000	92025-1870	0
2.025	92180-0209	3
2.050	92025-1871	5
2.075	92180-0210	8
2.100	92025-1872	10
2.125	92180-0211	13
2.150	92025-1873	15
2.175	92180-0212	18
2.200	92025-1874	20
2.225	92180-0213	23
2.250	92025-1875	25
2.275	92180-0214	28
2.300	92025-1876	30
2.325	92180-0215	33
2.350	92025-1877	35
2.375	92180-1058	38
2.400	92025-1878	40
2.425	92025-1982	43
2.450	92025-1879	45
2.475	92025-1983	48
2.500	92025-1880	50
2.525	92025-1984	53
2.550	92025-1881	55
2.575	92025-1985	58
2.600	92025-1882	60
2.625	92180-1059	63
2.650	92025-1883	65
2.675	92180-1194	68
2.700	92025-1884	70
2.725	92180-1195	73
2.750	92025-1885	75



Periodic Maintenance Procedure

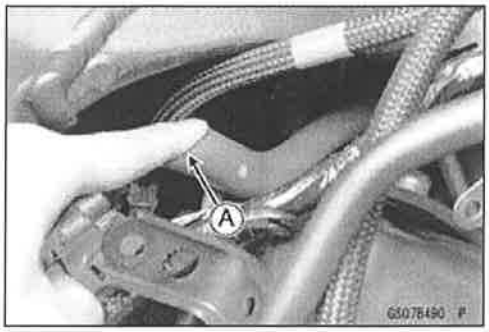
Air Suction System Damage Inspection

- Remove the right subframe (see Right Subframe Removal in the Frame chapter).
- Pull the air switching valve hose [A] out of the frame.



- Start the engine and run it at idle speed.
- Plug [A] the air switching valve hose end with your finger and feel vacuum pulsing in the hose.

★If there is no vacuum pulsation, check the hose line for leak. If there is no leak, check the air switching valve (see Air Switching Valve Unit Test in the Electrical System chapter) or air suction valve (see Air Suction Valve Inspection in the Engine Top End chapter).



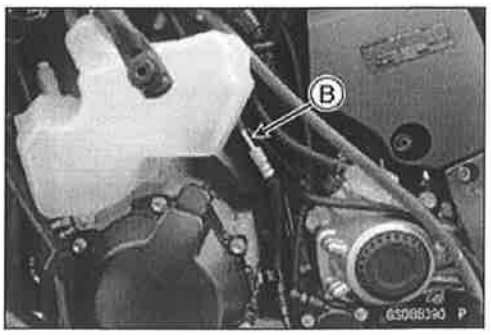
Clutch

Clutch System Inspection

Clutch Fluid Leak Inspection

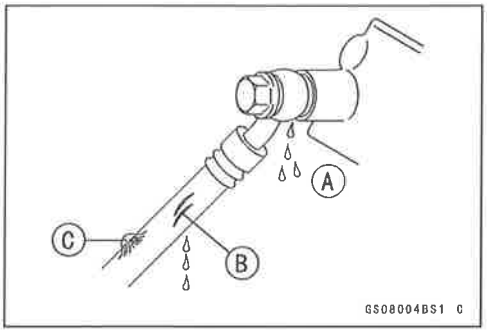
- Apply the clutch lever and inspect the clutch fluid leak from the clutch hose [A], pipe [B] and fittings.

★If the clutch fluid leaked from any position, inspect or replace the problem part.



Periodic Maintenance Procedure

Clutch Hose Damage and Installation Condition Inspection



- Inspect the clutch hoses and fittings for deterioration, cracks, corrosion and signs of leakage.

○The high pressure inside the clutch line can cause fluid to leak [A] or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★Replace it if any fraying, cracks [B] or bulges [C] are noticed.

- Check that the hoses are securely connected and banjo bolts are tightened correctly.

Torque - Clutch Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Inspect the clutch hose routing.

★If any clutch hose routing is incorrect, run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.

★Replace the hose if the hose been sharply bent or kinked.

Clutch Operation Inspection

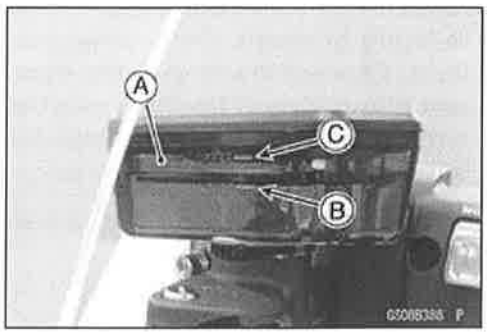
- Start the engine and check that the clutch does not slip and that it releases properly.

★If the clutch operation is insufficiency, inspect the clutch system.

⚠ WARNING

When test riding the vehicle, be aware of surrounding traffic for your safety.

Clutch Fluid Level Inspection



- Hold the clutch fluid reservoir [A] horizontal.
- Check that the clutch fluid level of the clutch reservoir is between the lower [B] and the upper [C] level lines.

★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line in the reservoir.

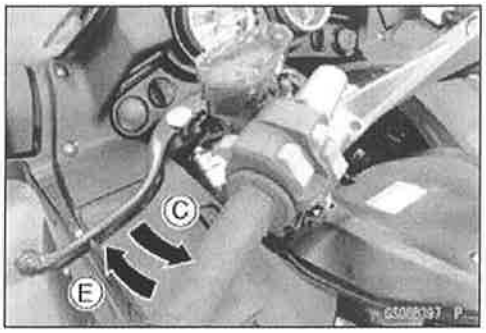
○Since the clutch fluid is the same as the brake fluid, refer to the Brake Fluid section in the Brake chapter for further details.

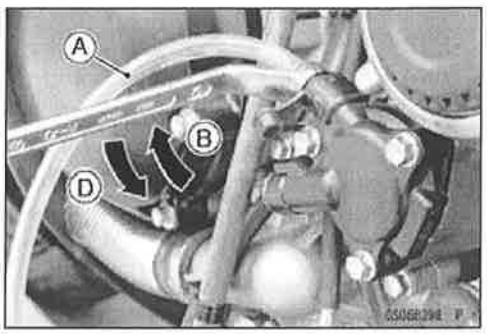
⚠ WARNING

Mixing brands and types of hydraulic fluid lowers the fluid's boiling point, cause rubber part to deteriorate and can reduce the hydraulic clutch system's effectiveness and cause an accident resulting in injury or death. Do not mix two brands of brake fluid. Change the fluid in the hydraulic clutch system completely if the fluid must be refilled but the type and brand of the hydraulic fluid that is already in the reservoir are unidentified.

Periodic Maintenance Procedure

Clutch Fluid Change





- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter)
- Level the clutch fluid reservoir and remove the reservoir cap.
- Remove the rubber cap from the bleed valve on the clutch slave cylinder.
- Attach a clear plastic hose [A] to the bleed valve and run the other end of the hose into a container.
- Fill the reservoir with fresh fluid.
- Change the clutch fluid as follows.

1. Open [B] the bleed valve, using a wrench.
2. Pump the clutch lever and hold [C] it.
3. Close [D] the bleed valve.
4. Release [E] the clutch lever.

○Repeat this operation until fresh fluid comes out from the plastic hose or the color of the fluid changes.

○Check the fluid level in the reservoir often, replenishing it as necessary.

NOTE

○*If the fluid in the reservoir runs completely out any time during fluid changing, the bleeding operation must be done over again from the beginning since air will have entered the line.*

⚠ WARNING

Mixing brands and types of hydraulic fluid lowers the fluid's boiling point, cause rubber part to deteriorate and can reduce the hydraulic clutch system's effectiveness and cause an accident resulting in injury or death. Do not mix two brands of brake fluid. Change the fluid in the hydraulic clutch system completely if the fluid must be refilled but the type and brand of the hydraulic fluid that is already in the reservoir are unidentified.

- After changing the fluid, check the clutch for good clutch power and no fluid leakage.

★If necessary, bleed the air from the lines (see Clutch Line Bleeding in the Clutch chapter).

- Remove the clear plastic hose.
- Install the reservoir cap.
- Tighten the bleed valve, and install the rubber cap.

Torque - Clutch Slave Cylinder Bleed Valve: 8.4 N·m (0.86 kgf·m, 74 in·lb)

Clutch Hose Replacement

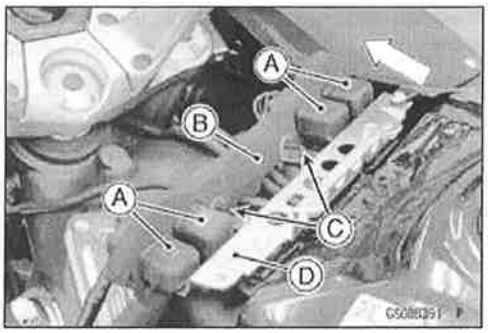
NOTICE

Clutch fluid quickly ruins painted plastic surfaces; any spilled fluid should be completely washed away immediately.

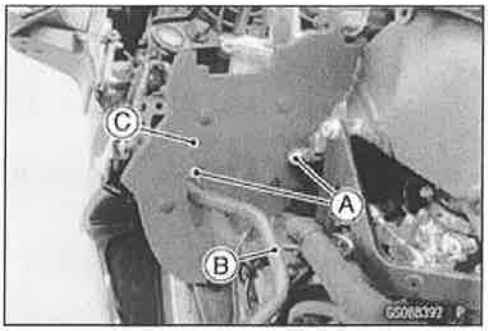
- When removing the clutch hose, take care not to spill the clutch fluid on the painted or plastic parts.

Periodic Maintenance Procedure

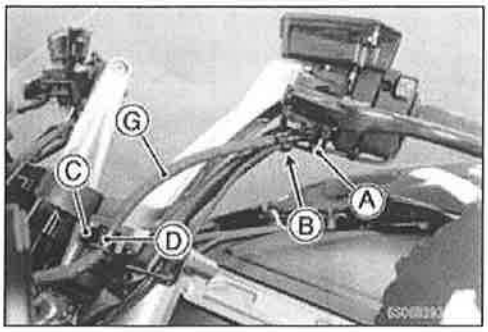
- Remove:
  Left Rear Middle Fairing (see Rear Middle Faring Removal in the Frame chapter)
  Left Lower Fairing (see Lower Fairing Removal in the Frame chaprter)
- Pull the relays [A] with pad [B] forward to clear the rivets [C] and relays from the bracket [D].

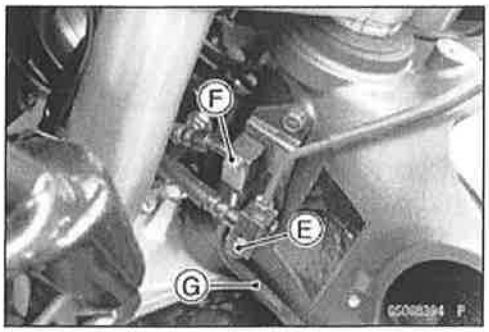


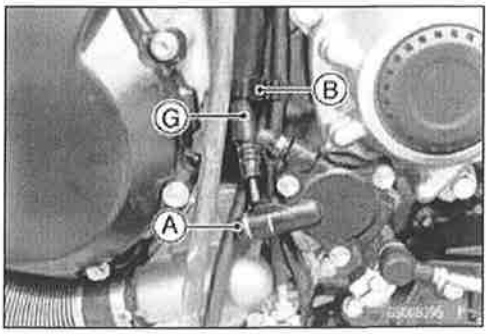
- Remove the bolts [A].
- Clear the left fairing stay [B] with pad [C].



- Remove:
  Left Subframe (see Left Subframe Removal in the Frame chapter)
  Clutch Hose Banjo Bolts [A] with Washers
  Clamps [B]
  Clutch Hose Clamp Bolt [C]
  Clamp [D]
  Brake Hose Joint Bolt [E]
  Clutch Hose Fitting Bolt [F]
  Clutch Hose [G]







- Immediately wash away any clutch fluid that spills.
- When installing the hoses, avoid sharp bending, kinking, flatting or twisting, and route the hoses according to Cable, Wire, and Hose Routing section in Appendix chapter.
- There are washers on each side of the clutch hose fittings. Replace them with new ones when installing.
- Tighten:

Torque - Clutch Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Clutch Hose Fitting Bolt: 8.0 N·m (0.82 kgf·m, 71 in·lb)
Brake Hose Joint Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)
Clutch Hose Clamp Bolt: 8.0 N·m (0.82 kgf·m, 71 in·lb)

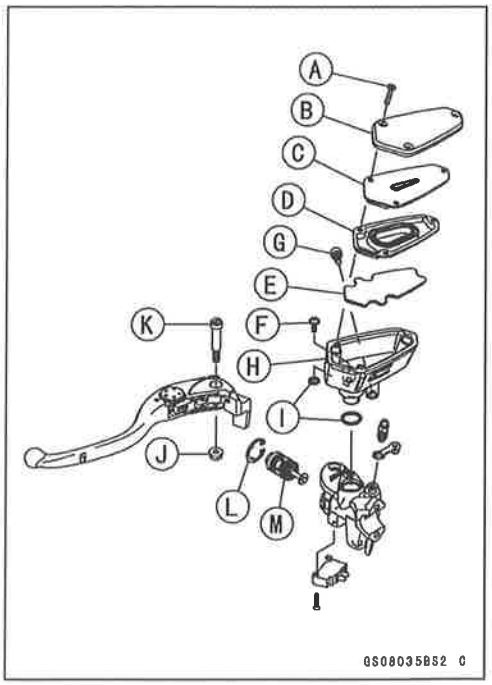
- Fill the clutch line after installing the clutch hose (see Clutch Fluid Change).

Rubber Parts of Clutch Master Cylinder/Slave Cylinder Replacement

Clutch Master Cylinder Cup and Dust Seal Replacement

- Remove the clutch master cylinder (see Clutch Master Cylinder Removal in the Clutch chapter).
- Remove:
  Clutch Reservoir Cap Screws [A]
  Cap [B]
  Diaphragm Plate [C]
  Diaphragm [D]
  Float [E]
  Clutch Reservoir Screw [F]
  Clutch Reservoir Bolt [G]
  Fluid Reservoir [H]
  O-rings [I]
  Locknut [J]
  Pivot Bolt [K]
  Clutch Lever
  Circlip [L]

Special Tool - Inside Circlip Pliers: 57001-143



- Pull out the piston assy [M].
- Replace:
  Diaphragm
  O-rings
  Circlip
  Piston Assy

Periodic Maintenance Procedure

- Before assembly, clean all parts including the master cylinder with clutch fluid or alcohol.

NOTICE
Use only disc brake fluid, isopropyl alcohol or ethyl alcohol for cleaning parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the cylinder.

- Apply clutch fluid to the parts removed and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply a non-permanent locking agent to the clutch reservoir screw and bolt.
- Tighten:

Torque - Clutch Reservoir Bolt: 7.8 N·m (0.80 kgf·m, 69 in·lb)
Clutch Reservoir Screw: 1.3 N·m (0.13 kgf·m, 12 in·lb)

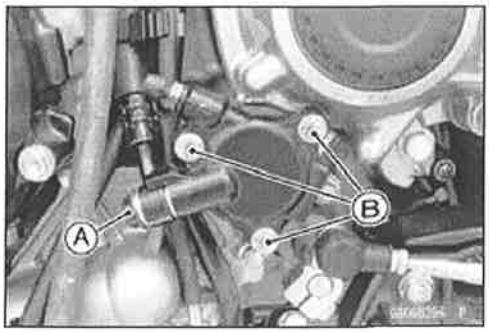
- Apply silicone grease to the clutch lever pivot bolt.
- Tighten:

Torque - Clutch Lever Pivot Bolt: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)
Clutch Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

- Install the clutch master cylinder (see Clutch Master Cylinder Removal in the Clutch chapter).

Clutch Slave Cylinder Piston Seal Replacement

- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- Loosen the banjo bolt [A] at the clutch pipe lower end, and tighten it loosely.
- Unscrew the slave cylinder bolts [B] and detach the slave cylinder with the pipe installed from the engine.
- Pump the clutch lever until the piston comes out of the cylinder.
- Unscrew the banjo bolt and remove the slave cylinder.



NOTICE
Immediately wash away any clutch fluid that spills. It may damage painted surfaces.

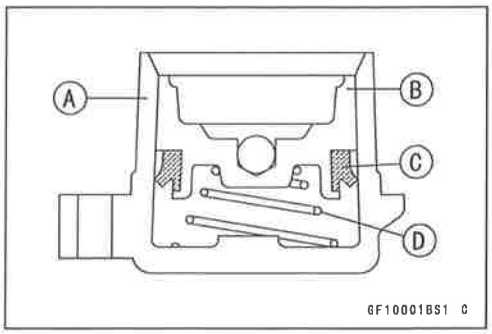
NOTE

○*If the clutch slave cylinder is removed and left alone, the piston will be pushed out by spring force.*

- Remove the spring and piston seal.

Periodic Maintenance Procedure

NOTICE
Replace the piston seal with a new one if it was removed from the piston.



- Before assembly, apply a rubber grease to the outside of the piston and the piston seal.
- Install the piston seal as shown.
  Cylinder [A]
  Piston [B]
  Piston Seal [C]
  Spring [D]

Engine Lubrication

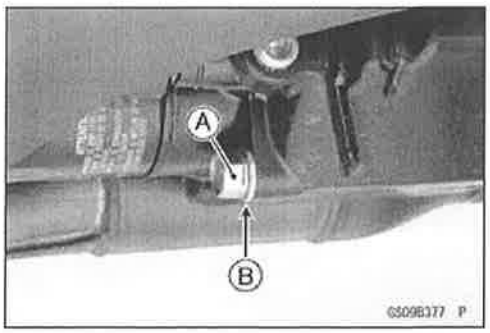
Engine Oil Change

- Situate the motorcycle so that it is vertical after warming up the engine.
- Remove the engine oil drain bolt [A] to drain the oil.

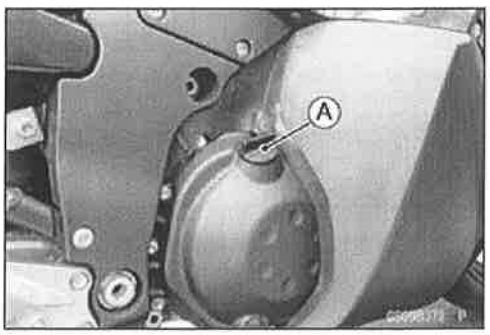
○The oil in the oil filter can be drained by removing the filter (see Oil Filter Replacement).

- Replace the drain bolt gasket [B] with a new one.
- Tighten the drain bolt with the drain bolt gasket.

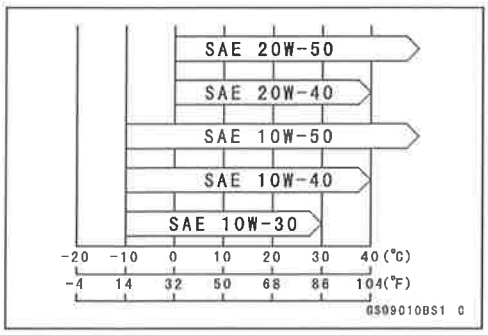
Torque - Engine Oil Drain Bolt: 29 N·m (3.0 kgf·m, 21 ft·lb)



- Remove the oil filler plug [A].



Periodic Maintenance Procedure



- Pour in the specified type and amount of oil.

Recommended Engine Oil

Type:	**API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2**
Viscosity:	**SAE 10W-40**
Capacity:	**4.0 L (4.2 US qt) (when filter is not removed)**
	4.4 L (4.7 US qt) (when filter is removed)
	4.7 L (5.0 US qt) (when engine is completely dry)

NOTE

○Do not add any chemical additive to the oil. Oils fulfilling the above requirements are fully formulated and provide adequate lubrication for both the engine and the clutch.

○Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.

- Replace the O-ring of the oil filler plug with a new one.
- Apply engine oil to the new O-ring.
- Install the oil filler plug.

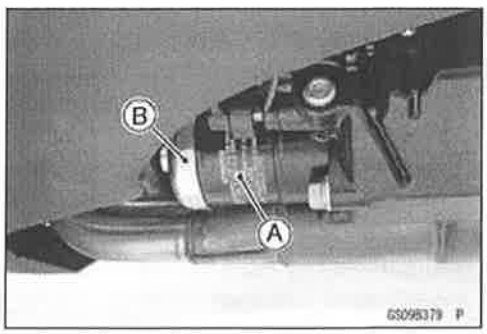
Torque - Oil Filler Plug: Hand-tighten

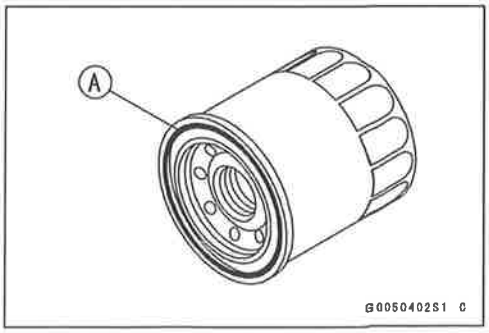
- Check the oil level (see Oil Level Inspection in the Engine Lubrication System chapter).

Oil Filter Replacement

- Drain the engine oil (see Engine Oil Change).
- Remove the oil filter [A] with the oil filter wrench [B].

Special Tool - Oil Filter Wrench: 57001-1249





- Replace the filter with a new one.
- Apply engine oil to the gasket [A] of the new filter before installation.
- Tighten the filter with the oil filter wrench.

Torque - Oil Filter: 17 N·m (1.7 kgf·m, 13 ft·lb)

NOTE

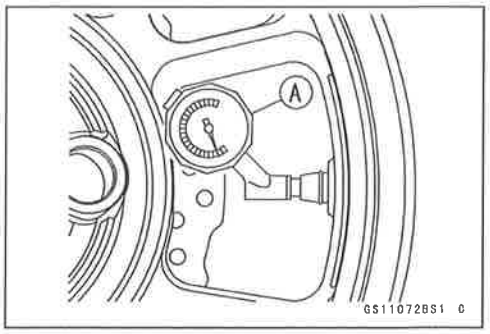
○Hand tightening of the oil filter can not be allowed since it does not reach to this tightening torque.

- Pour in the specified type and amount of oil (see Engine Oil Change).

Periodic Maintenance Procedure

Wheels/Tires

Air Pressure Inspection



- Remove the air valve cap.
- Measure the tire air pressure with an air pressure gauge [A] when the tires are cold (that is, when the motorcycle has not been ridden more than a mile during the past 3 hours).
- Install the air valve cap.

★Adjust the tire air pressure according to the specifications if necessary.

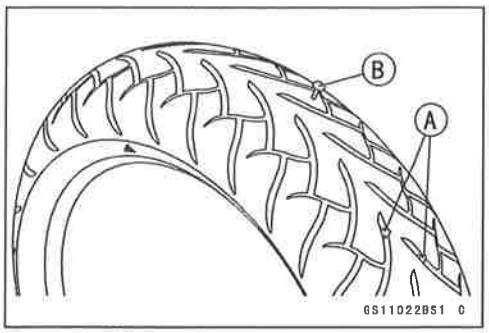
Air Pressure (when Cold)

Front: 290 kPa (2.90 kgf/cm², 42 psi)

Rear: 290 kPa (2.90 kgf/cm², 42 psi)

Wheels and Tires

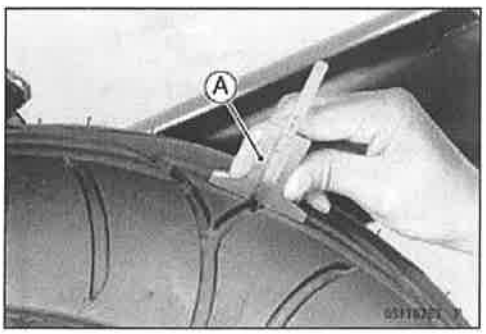
Wheel/Tire Damage Inspection



- Remove any imbedded stones [A] or other foreign particles [B] from tread.
- Visually inspect the tire for cracks and cuts, and replace the tire if necessary. Swelling or high spots indicate internal damage, requiring tire replacement.
- Visually inspect the wheel for cracks, cuts and dents damage.

★If any damage is found, replace the wheel if necessary.

Tire Tread Wear Inspection



As the tire tread wears down, the tire becomes more susceptible to puncture and failure. An accepted estimate is that 90% of all tire failures occur during the last 10% of tread life (90% worn). So it is false economy and unsafe to use the tires until they are bald.

- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurement at several places.

★If any measurement is less than the service limit, replace the tire (see Tire Removal/Installation in the Wheels/Tires chapter).

Tread Depth

Standard:

Front	**4.8 mm (0.19 in.)**
Rear	**6.2 mm (0.24 in.)**

Service Limit:

Front	**1 mm (0.04 in.)**
	(AT, CH, DE) 1.6 mm (0.06 in.)
Rear	**2 mm (0.08 in.)**
	(Up to 130 km/h (80 mph))
	3 mm (0.12 in.)
	(Over 130 km/h (80 mph))

Periodic Maintenance Procedure

⚠ WARNING

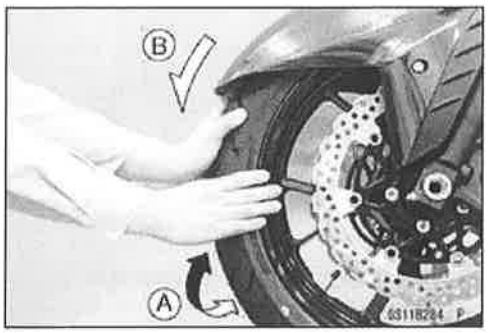
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

NOTE

○*Most countries may have their own regulations a minimum tire tread depth: be sure to follow them.*

○*Check and balance the wheel when a tire is replaced with a new one.*

Wheel Bearing Damage Inspection



- Raise the front wheel off the ground with the jack (see Front Wheel Removal in the Wheels/Tires chapter).
- Turn the handlebar all the way to the right or left.
- Inspect the roughness of the front wheel bearing by moving the wheel to left and right side [A].
- Spin [B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.

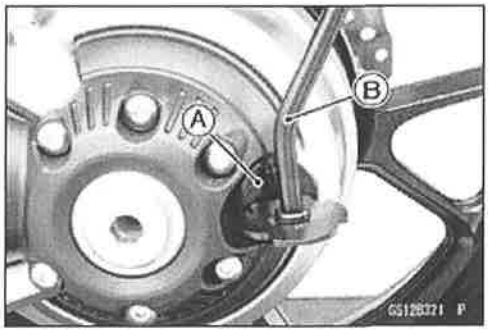
★If roughness, binding or noise is found, remove the front wheel and inspect the wheel bearing (see Hub Bearing Inspection in the Wheels/Tires chapter).

- Raise the rear wheel off the ground with the center stand (see Rear Wheel Removal in the Wheels/Tires chapter).
- Spin [A] the rear wheel lightly, and check for smoothly turn, roughness, binding or noise.

★If roughness, binding or noise is found, remove the rear wheel and inspect the wheel bearing (see Hub Bearing Inspection in the Wheels/Tires chapter) and coupling (see Coupling Bearing Inspection in the Final Drive chapter).

Final Drive

Oil Level Inspection



⚠ WARNING

Vehicle operation with insufficient, deteriorated, or contaminated gear oil will cause accelerated wear and may result in pinion and ring gears seizure, accident, and injury. Check the oil level before each use and change the oil according to the periodic maintenance chart.

- Support the motorcycle perpendicular to the ground.
- Unscrew the filler plug [A], using the fuller cap driver [B].

Special Tool - Filler Cap Driver: 57001-1454

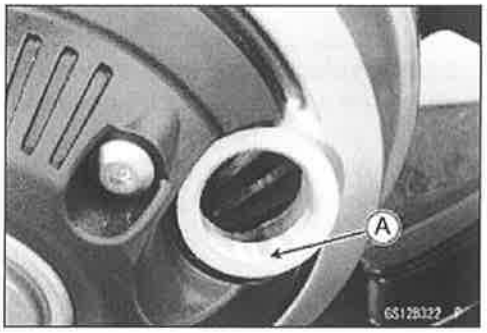
Periodic Maintenance Procedure

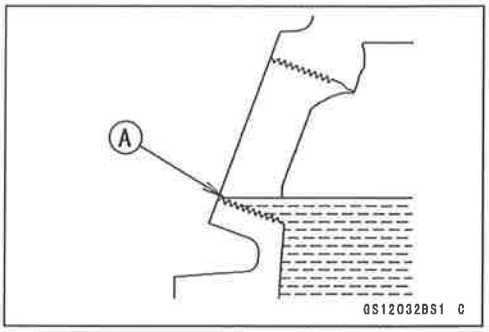
- The oil level [A] should come to the top of the filler opening.

★If it is low, first check the final gear case for oil leakage, remedy it if necessary, and add oil through the filler opening. Use the same type and brand of oil that is already in the final gear case.

- Tighten:

Torque - Filler Plug: 6.0 N·m (0.61 kgf·m, 53 in·lb)

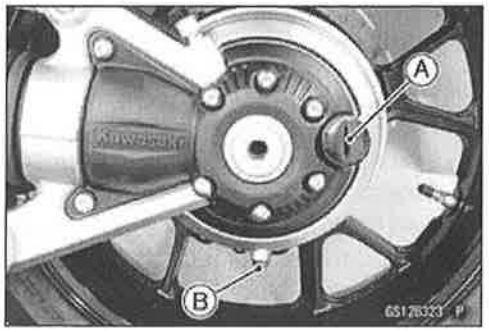




Final Gear Case Oil Change

- Warm up the oil by running the motorcycle so that the oil will pick up any sediment and drain easily. Stop the motorcycle and turn the key knob to OFF.
- Place an oil pan beneath the final gear case, and remove the filler plug [A] and drain bolt [B].

Special Tool - Filler Cap Driver: 57001-1454



⚠ WARNING

Oil on tires can cause loss of traction and an accident resulting in serious injury or death. When draining or filling the final gear case, do not spill oil the tire or rim. Clean any oil that may spill with a high flash-point solvent.

- After the oil has completely drained out, install the drain bolt with a new gasket.

Torque - Final Gear Case Oil Drain Bolt: 17 N·m (1.7 kgf·m, 13 ft·lb)

Periodic Maintenance Procedure

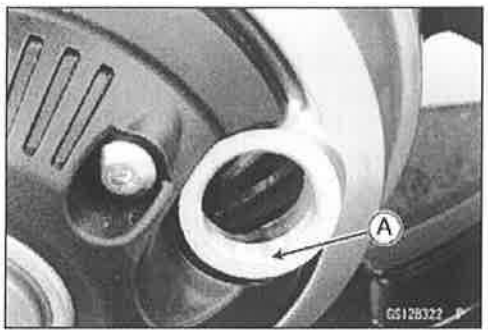
- Fill the final gear case with the specified oil and quantity.

○Do not rotate the rear wheel during the oil filling.

○The oil level [A] should come to the top of the filler opening.

Final Gear Case Oil:

Amount:	**about 160 mL (5.41 US oz)**
Grade:	**API GL-5 hypoid gear oil**
Viscosity:	**When above 5°C (41°F) SAE 90**
	When below 5°C (41°F) SAE 80

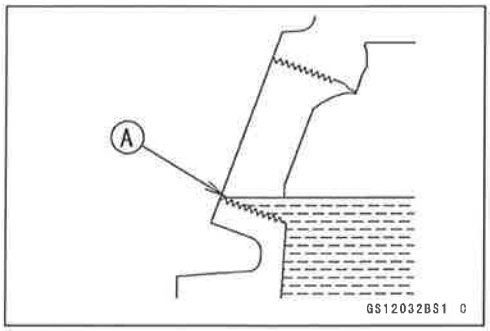


NOTE

○*The term "GL-5" indicates a quality and additive rating. A "GL-6" rated hypoid gear oil can also be used.*

- Be sure the O-ring is in place, and tighten the filler plug.

Torque - Filler Plug: 6.0 N·m (0.61 kgf·m, 53 in·lb)



Periodic Maintenance Procedure

Brakes

Brake System Inspection

Brake Fluid Leak (Brake Hose and Pipe) Inspection

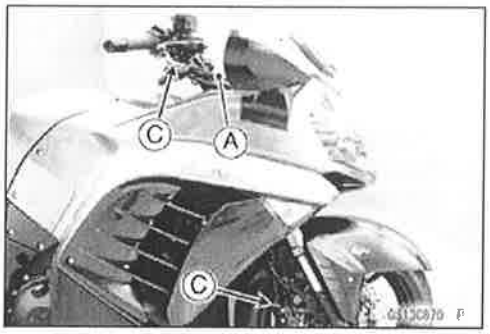
- Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A], pipes [B] and fittings [C].

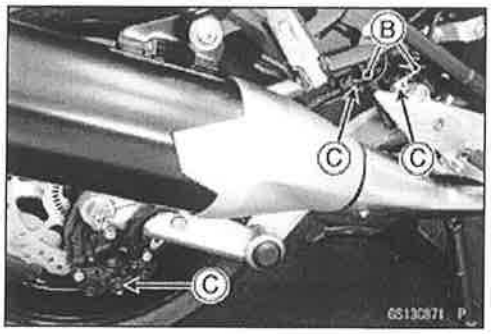
★ If the brake fluid leaked from any position, inspect or replace the problem part.

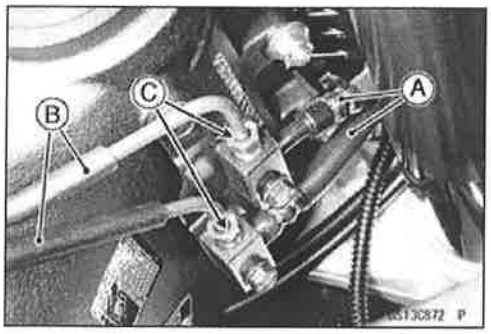
- Remove:

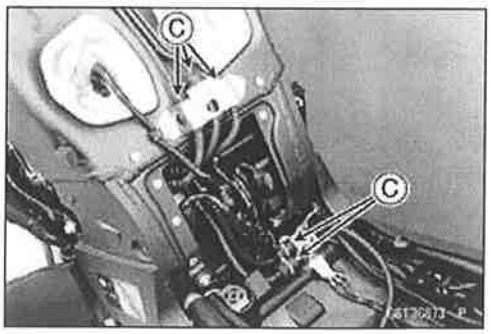
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)

  Battery Back Cover (see K-ACT ABS Hydraulic Unit Removal in the Brakes chapter)



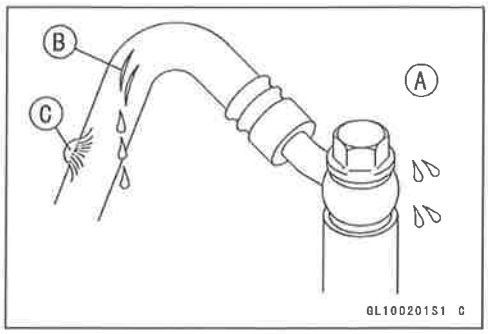






Periodic Maintenance Procedure

Brake Hose and Pipe Damage and Installation Condition Inspection



- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Battery (see Battery Removal in the Electrical System chapter)
- Inspect the brake hoses and fittings for deterioration, cracks and signs of leakage.

○The high pressure inside the brake line can cause fluid to leak [A] or the hose, pipes to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★Replace the hose and pipe if any crack [B], bulge [C] or leakage is noticed.

★Tighten any brake hose banjo bolts.

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Inspect the brake hose routing.

★If any brake hose and pipe routing is incorrect, route the brake hose and pipe according to Cable, Wire, and Hose Routing section in the Appendix chapter.

Brake Operation Inspection

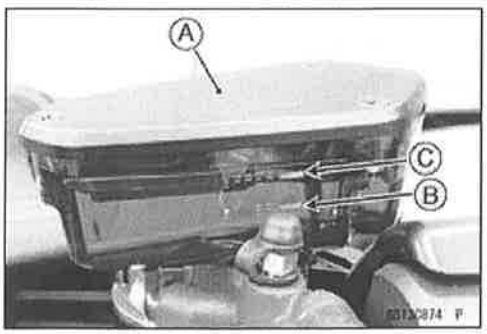
- Inspect the operation of the front and rear brake by running the vehicle on the dry road.

★If the brake operation is insufficiency, inspect the brake system.

⚠ WARNING

When test riding the vehicle, be aware of surrounding traffic for your safety.

Brake Fluid Level Inspection



- Check that the brake fluid level in the front brake reservoir [A] is above the lower level line [B].

NOTE

○*Hold the reservoir horizontal by turning the handlebar when checking brake fluid level.*

★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [C].

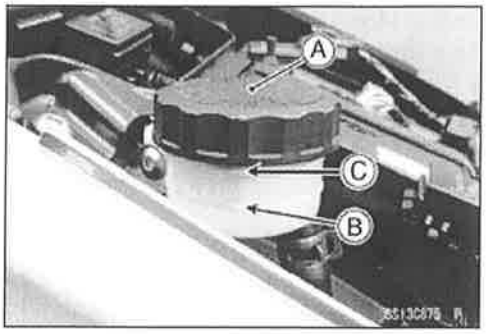
NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

Periodic Maintenance Procedure

- Remove the seat (see Seat Removal in the Frame chapter).
- Check that the brake fluid level in the rear brake reservoir [A] is above the lower level line [B].

★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [C].



⚠ WARNING

Mixing brands and types of brake fluid can reduce the brake system's effectiveness and cause an accident resulting in injury or death. Do not mix two brands of brake fluid. Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified.

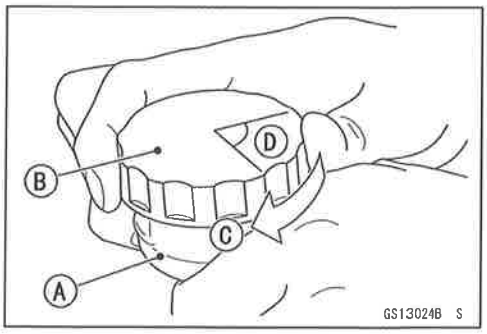
NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

Recommended Disc Brake Fluid
Grade: DOT4

- Follow the procedure below to install the rear brake fluid reservoir cap correctly.

○First, tighten the rear brake fluid reservoir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body [A].

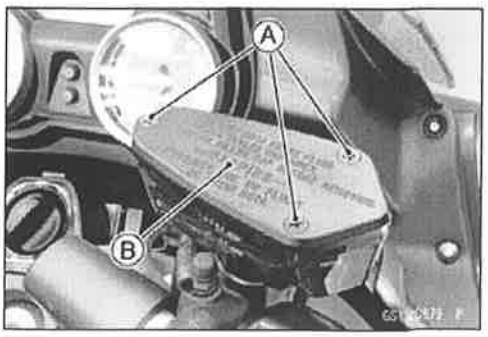


Brake Fluid Change

NOTE

○*The procedure to change the front brake fluid is as follows. Changing the rear brake fluid is the same as for the front brake.*

- Level the brake fluid reservoir.
- Remove:
  Screws [A]
  Reservoir Cap [B]
  Diaphragm

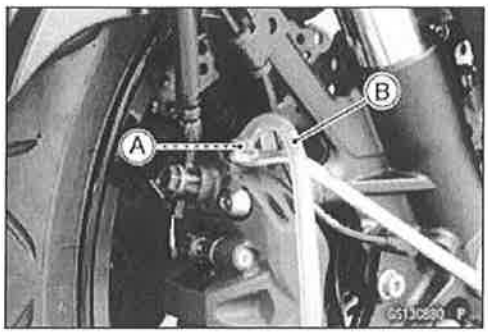


NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

Periodic Maintenance Procedure

- Remove the rubber cap from the bleed valve [A] on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.
- Fill the reservoir with fresh specified brake fluid.



- Change the brake fluid.

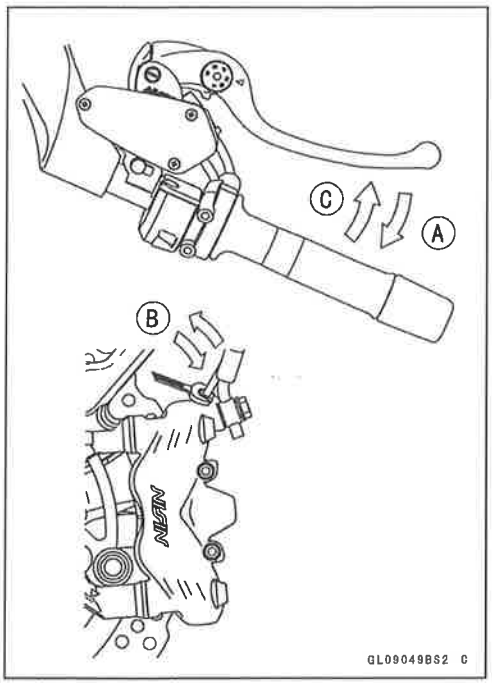
○Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.

1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
2. Quickly open and close [B] the bleed valve while holding the brake applied.
3. Release the brake [C].

NOTE

○*The fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reservoir runs out any time during the changing operation, the brakes will need to be bled since air will have entered the brake line.*

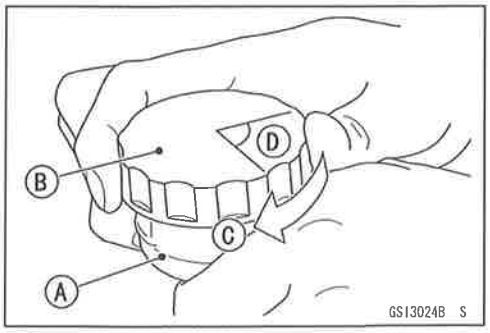
○*Front Brake: Repeat the above steps for the other caliper.*



- Remove the clear plastic hose.
- Install the diaphragm and reservoir cap.

- Follow the procedure below to install the rear brake fluid reservoir cap correctly.

○First, tighten the reservoir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/6 turn [D] while holding the reservoir body [A].



- Tighten the bleed valve, and install the rubber cap.

Torque - Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.

★If necessary, bleed the air from the lines.

Periodic Maintenance Procedure

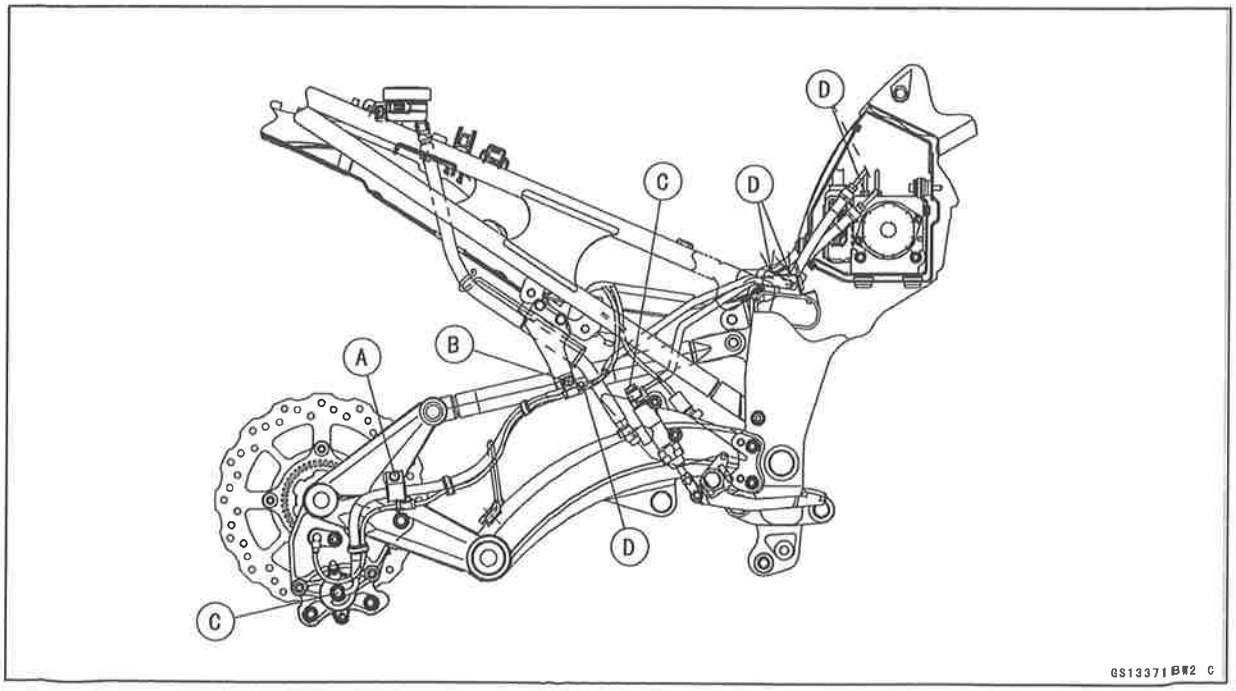
Brake Hose and Pipe Replacement

NOTICE
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

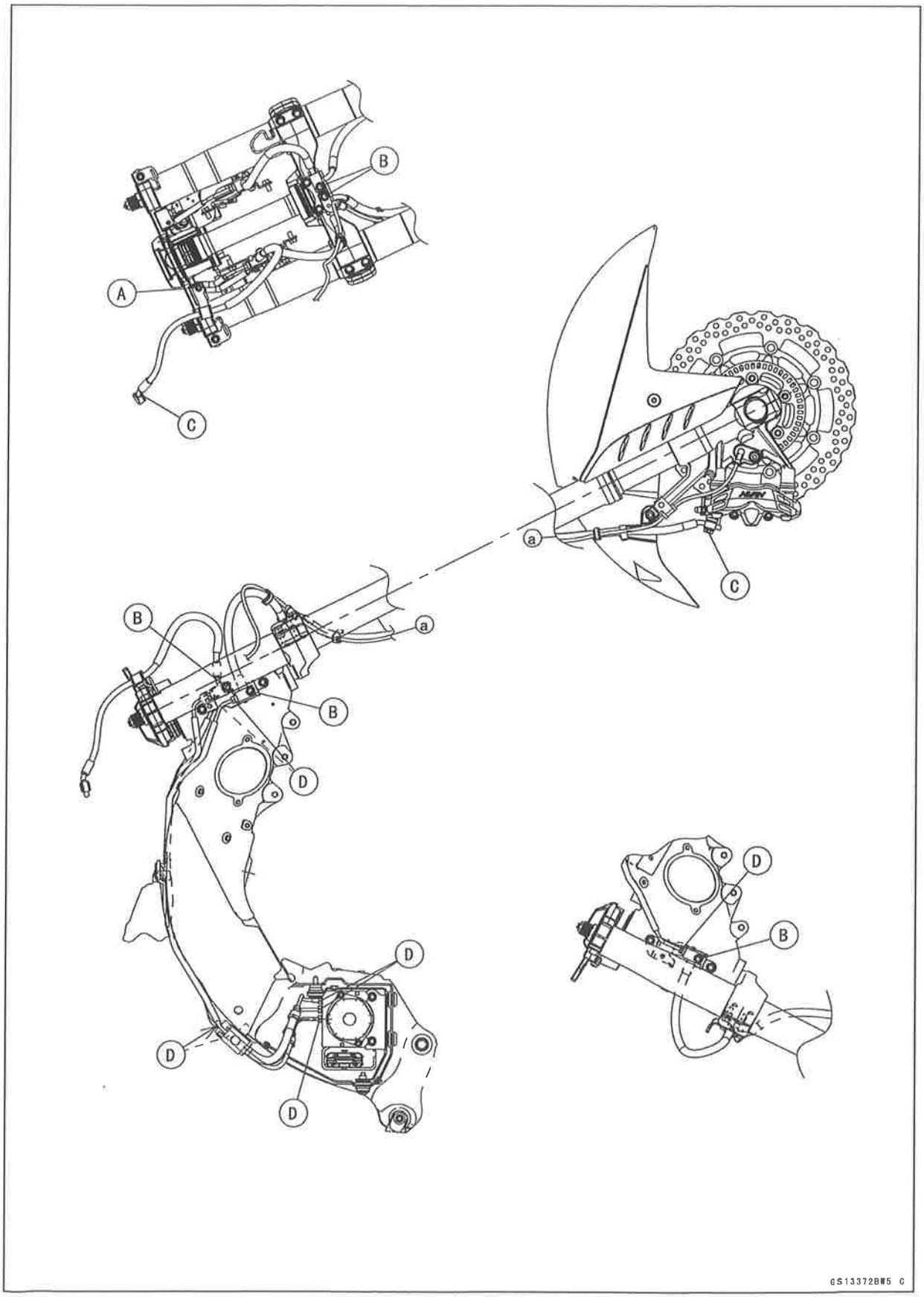
NOTE

○*When removing the brake pipes and hoses on the hydraulic unit, remove them with the flare nut wrench according to each assembly of the exploded view in the Brakes chapter.*

- Remove:
  Inner Covers (see Inner Cover Removal in the Frame chapter)
  Upper Inner Fairing (see Upper Inner Fairing Removal in the Frame chapter)
  Steering Stem Cover (see Stem, Stem bearing Removal in the Steering chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Battery (see Battery Removal in the Electrical System chapter)
  Upper Fairing (see Upper Fairing Removal in the Frame chapter)
  Brake Hose Clamp Bolts [A]
  Brake Hose Joint Bolts [B]
  Brake Hose Banjo Bolts [C]
  Brake Pipe Joint Nuts [D]
  Clamps
- When removing the brake hose and pipe, take care not to spill the brake fluid on the painted or plastic parts.
- Immediately wash away any brake fluid that spills.



Periodic Maintenance Procedure



- There are washers on each side of the brake hose and pipe fitting. Replace them with new ones when installing.
- Before installing the brake pipe, check to see that there is no damage on the threads of the brake pipe joint nut.

★ If there is any damage, replace the damaged parts with new ones.

NOTE

○ *Tighten the brake pipe joint nut at both ends of the brake pipe temporarily and then tighten them to the specified torque.*

- Install the brake pipes and brake hoses to the specified angle (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten the brake pipe joint nuts with the flare nut wrench.
- Tighten:

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Pipe Joint Nuts: 18 N·m (1.8 kgf·m, 13 ft·lb)
Brake Hose Clamp Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)
Brake Hose Joint Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)

- Fill the brake line after installing the brake hose and pipe (see Brake Fluid Change).

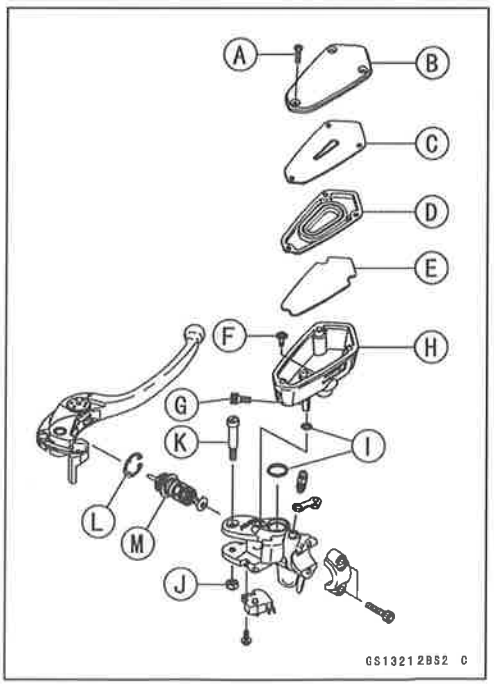
Master Cylinder Rubber Parts Replacement

Front Master Cylinder Disassembly

- Remove the front master cylinder (see Front Master Cylinder Removal in the Brakes chapter).
- Remove:
  Screws [A]
  Cap [B]
  Diaphragm Plate [C]
  Diaphragm [D]
  Float [E]
  Screw [F]
  Bolt [G]
- Pull out the fluid reservoir [H] and O-rings [I].
- Unscrew the locknut [J] and pivot bolt [K], and remove the brake lever.
- Remove the circlip [L].

Special Tool - Inside Circlip Pliers: 57001-143

- Pull out the piston assy [M].
- Replace:
  Diaphragm [D]
  O-ring [I]
  Circlip [L]
  Piston Assy [M]



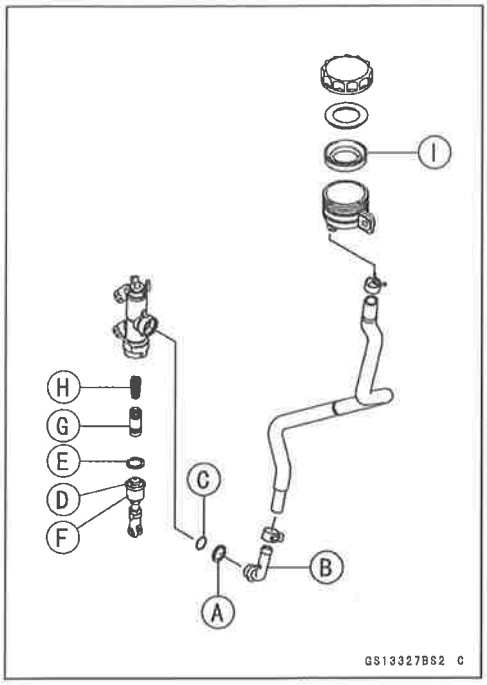
Periodic Maintenance Procedure

Rear Master Cylinder Disassembly

- Remove the rear master cylinder (see Rear Master Cylinder Removal in the Brakes chapter).
- Remove the circlip [A], connector [B] and O-ring [C].

Special Tool - Inside Circlip Pliers: 57001-143

- Slide the dust cover [D] out of place, and remove the circlip [E].
- Pull out the push rod assy [F].
- Take off the piston assy [G] and return spring [H].



NOTICE

Do not remove the secondary cup from the piston since removal will damage it.

- Replace:
  Circlip [A]
  O-ring [C]
  Circlip [E]
  Push Rod Assy [F]
  Piston Assy [G]
  Diaphragm [I]

Master Cylinder Assembly

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

NOTICE

Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

- Apply brake fluid to the new parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- For the front master cylinder, apply a non-permanent locking agent to the brake reservoir screw and bolt.
- Tighten:

Torque - Brake Reservoir Bolt: 7.8 N·m (0.80 kgf·m, 69 in·lb)
Brake Reservoir Screw: 1.3 N·m (0.13 kgf·m, 12 in·lb)

- Apply silicone grease to the contact portion of the push rod and brake lever pivot bolt.
- Tighten:

Torque - Brake Lever Pivot Bolt: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)
Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

Periodic Maintenance Procedure

Caliper Rubber Parts Replacement

Front Caliper Disassembly

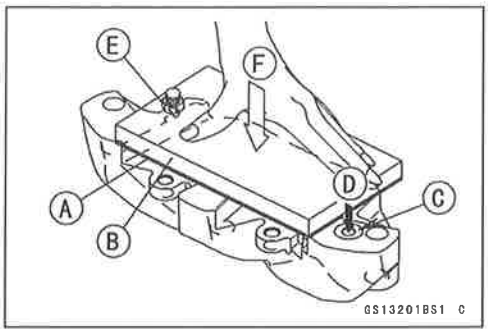
- Remove:
  Brake Pads (see Front Brake Pad Removal in the brakes chapter)
  Front Caliper (see Front Caliper Removal in the Brakes chapter)
  Front Caliper Assembly Bolts
  O-ring

- Using compressed air, remove the pistons. One way to remove the pistons is as follows.

○Install a rubber gasket [A] and a wooden board [B] more than 10 mm (0.4 in.) thick on the caliper half, and fasten them together with a suitable bolt and nut as shown. Leave one of the oil passages [C] open.

○Lightly apply compressed air [D] to the oil passage until the pistons hit the rubber gasket.

○For the hose joint side caliper half, block the hose joint opening during this operation if the caliper half has the opening.
  Bolt [E] and Nut
  Push down [F].

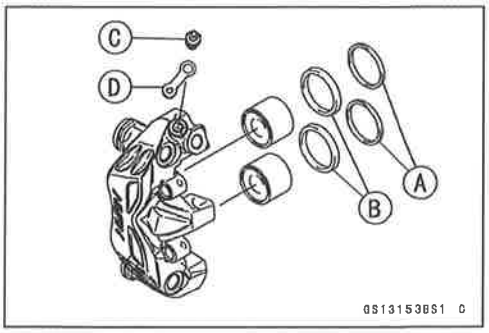


⚠ WARNING

The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.

○Pull out the pistons by hand.

- Remove the dust seals [A] and fluid seals [B].
- Remove the bleed valve [C] and rubber cap [D].
- Repeat the previous step to remove the pistons from the other side of the caliper body.



NOTE

○*Prepare a container for brake fluid, and perform the work above it.*

○*Remove the pad springs and pads (see Front Brake Pad Removal in the Brakes chapter).*

○*Pump the brake lever until the pistons come out of the cylinders, and then disassemble the caliper.*

Front Caliper Assembly

- Clean the caliper parts except for the pads.

NOTICE

For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

- Install the bleed valve and rubber cap.

Torque - Front Caliper Bleed Valve: 5.4 N·m (0.55 kgf·m, 48 in·lb)

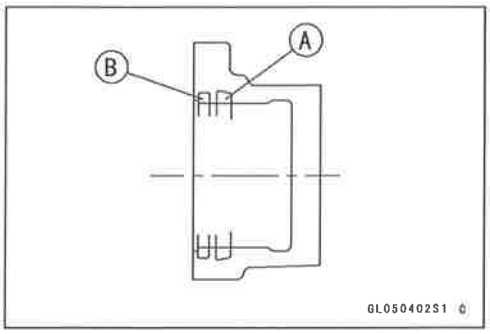
Periodic Maintenance Procedure

- Replace the fluid seals [A] with new ones.

○Apply silicone grease to the fluid seals, and install them into the cylinders by hand.

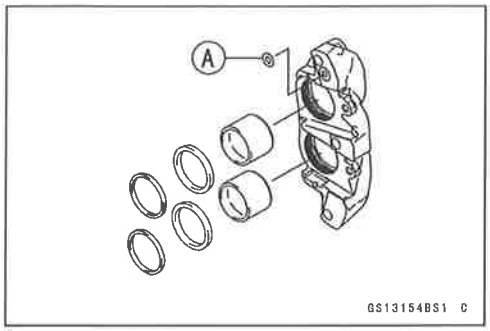
- Replace the dust seals [B] with new ones if they are damaged.

○Apply silicone grease to the dust seals, and install them into the cylinders by hand.



- Replace the O-ring [A].
- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Be sure to install the O-ring.
- Apply a non-permanent locking agent to the threads of the front caliper assembly bolts, and tighten them.

Torque - Front Caliper Assembly Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)



- Install the pads (see Front Brake Pad Installation in the Brakes chapter).
- Wipe up any spilled brake fluid on the caliper with wet cloth.

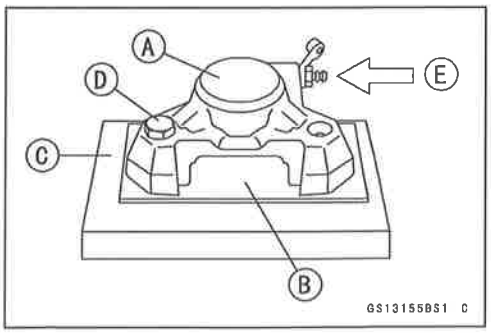
Rear Caliper Disassembly

- Remove:

Brake Pads (see Rear Brake Pad Removal in the Brakes chapter)
Rear Caliper (see Rear Caliper Removal in the Brakes chapter)
Rear Caliper Assembly Bolts
O-ring

- Remove the left side piston is the same as for the front caliper.

Left Side Caliper [A]
Rubber Gasket [B]
Wooden Board [C]
Bolt [D] and Nut
Apply compressed air [E]

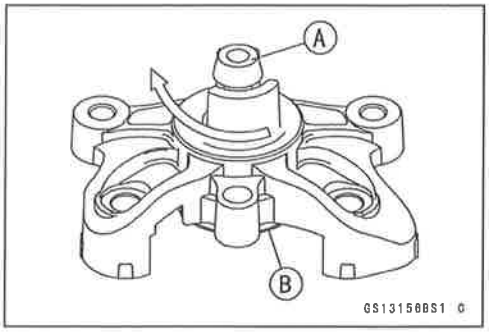


⚠ WARNING

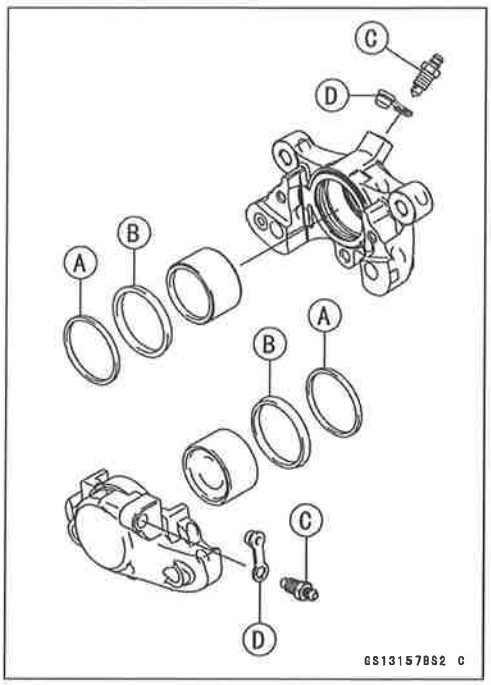
The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.

Periodic Maintenance Procedure

- Remove the right side piston as follows.
- Using the rear caliper assembly bolt [A], remove the piston [B] as shown.



- Remove the dust seals [A] and fluid seals [B].
- Remove the bleed valves [C] and rubber caps [D].



NOTE

○*Prepare a container for brake fluid, and perform the work above it.*
○*Remove the pads and pad spring (see Rear Brake Pad Removal in the Brakes chapter).*
○*Pump the brake pedal to remove the caliper piston.*

Rear Caliper Assembly

- Clean the caliper parts except for the pads.

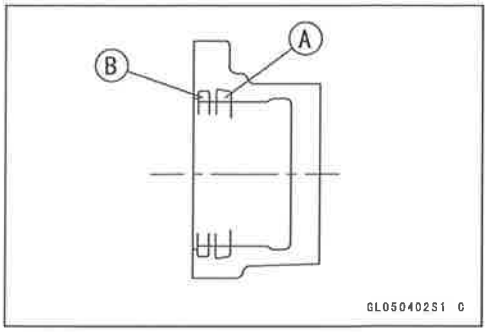
NOTICE
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

- Install the bleed valves and rubber caps.

Torque - Rear Caliper Bleed Valves: 5.4 N·m (0.55 kgf·m, 48 in·lb)

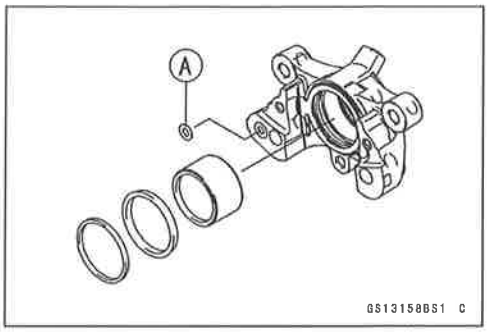
Periodic Maintenance Procedure

- Apply brake fluid to the cylinder bores.
- Replace the fluid seals [A] with new ones.
- Apply silicone grease to the fluid seals, and install them into each cylinder by hand.
- Replace the dust seals [B] with new ones.
- Apply brake fluid to the dust seals, and install them into each cylinder by hand.



- Replace the O-ring [A] with a new one.
- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Be sure to install the O-ring.
- Apply a non-permanent locking agent to the threads of the rear caliper assembly bolts, and tighten them.

Torque - Rear Caliper Assembly Bolts: 37 N·m (3.8 kgf·m, 27 ft·lb)



- Install the pads (see Rear Brake Pad Installation in the Brakes chapter).
- Wipe up any spilled brake fluid on the caliper with wet cloth.

Brake Pad Wear Inspection

- Check the lining thickness [A] of the pads in each caliper.

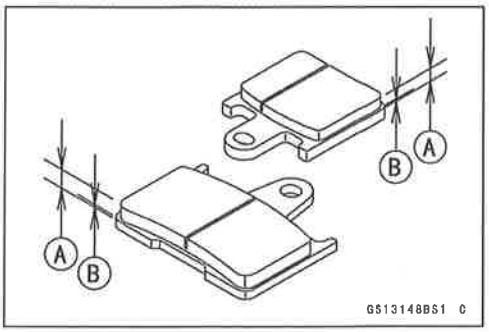
★If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.

Pad Lining Thickness

Standard:

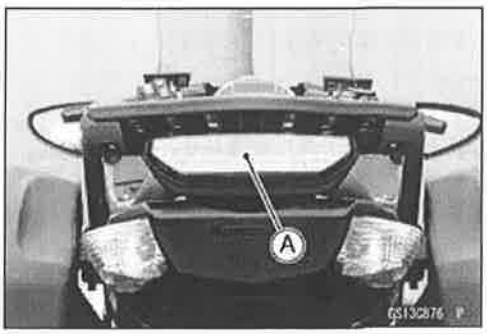
Front	**4.0 mm (0.16 in.)**
Rear	**5.0 mm (0.20 in.)**

Service Limit: 1 mm (0.04 in.)



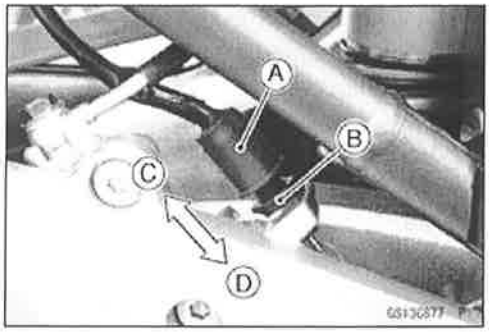
Brake Light Switch Operation Inspection

- Push and turn the key knob to ON.
- The brake light [A] should go on when the brake lever is applied or after the brake pedal is depressed about 10 mm (0.39 in.).



Periodic Maintenance Procedure

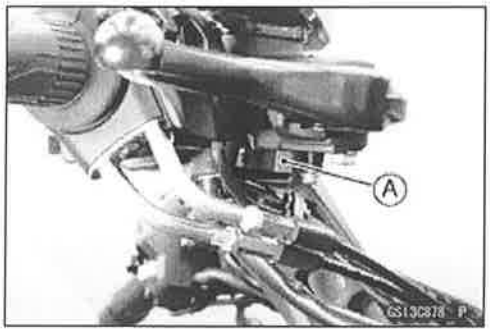
★If it does not, adjust the brake light switch.
- While holding the switch body, turn the adjusting nut to adjust the switch.
  Switch Body [A]
  Adjusting Nut [B]
  Light sooner as the body rises [C]
  Light later as the body lowers [D]



NOTICE

To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.

★If it does not go on, inspect or replace the following items.
Battery (see Charging Condition Inspection in the Electrical System chapter)
Brake Light (see Tail/Brake Light Removal in the Electrical System chapter)
Main Fuse 30 A and Taillight Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Front Brake Light Switch [A] (see Switch Inspection in the Electrical System chapter)
Rear Brake Light Switch (see Switch Inspection in the Electrical System chapter)
Steering Lock Unit (see Steering Lock Unit Replacement in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)



Suspension

Suspension System Inspection

Front Forks/Rear Shock Absorber Operation Inspection

- Pump the forks down and up [A] 4 or 5 times, and inspect the smooth stroke.

★If the forks do not smoothly or noise is found, inspect the fork oil level or fork clamps (see Front Fork Oil Change in the Suspension chapter).

- Remove the saddlebags (see Saddlebag Removal in the Frame chapter).
- Pump the seat down and up [A] 4 or 5 times, and inspect the smooth stroke.

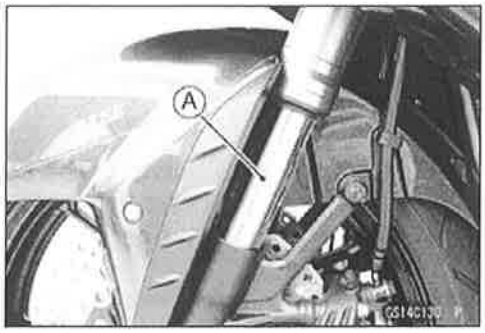
★If the shock absorber does not smoothly stroke or noise is found, inspect the oil leak (see Rear Shock Absorber Oil Leak Inspection).

Periodic Maintenance Procedure

Front Fork Oil Leak Inspection

- Visually inspect the front forks [A] for oil leakage.

★Replace any defective parts, if necessary.



Rear Shock Absorber Oil Leak Inspection

- Visually inspect the shock absorber [A] for oil leakage.

★If the oil leakage is found on it, replace the shock absorber with a new one.

Rocker Arm Operation Inspection

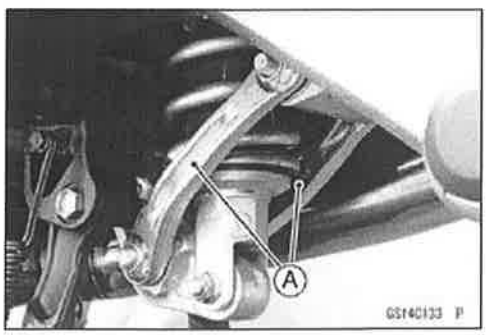
- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

★If the rocker arm [A] does not smoothly stroke or noise is found, inspect the fasteners and bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection in the Suspension chapter).

Tie-Rod Operation Inspection

- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

★If the tie-rods [A] do not smoothly stroke or noise is found, inspect the fasteners and tie-rod bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection in the Suspension chapter).



Periodic Maintenance Procedure

Steering

Steering Play Inspection

- Raise the front wheel off the ground with the jack.

  Special Tools - Jack: 57001-1238

- With the front wheel pointing straight ahead, alternately tap each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.

★If the wheel binds or catches before the stop, the steering is too tight.

- Feel for steering looseness by pushing and pulling the forks.

★If you feel looseness, the steering is too loose.

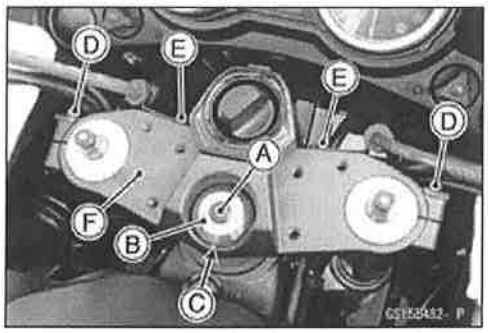
NOTE

○*The cables and wiring will have some effect on the motion of the fork which must be taken into account.*

○*Be sure the leads and cables are properly routed.*

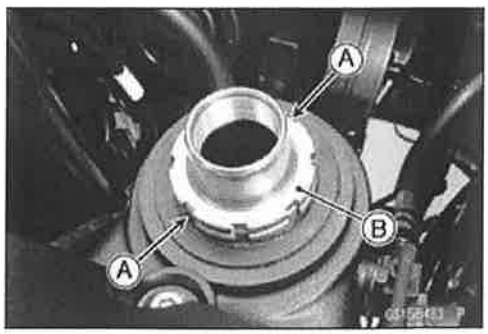
○*The bearings must be in good condition and properly lubricated in order for any test to be valid.*

Steering Play Adjustment

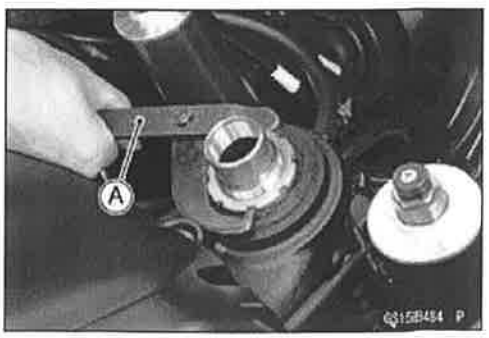


- Remove:

  Handlebar Holders (see Handlebar Holder Removal in the Steering chapter)
  Plug [A]
  Stem Head Nut [B] and Washer [C]
  Upper Fork Clamp Bolts [D] (Loosen)
  Hose Clamp Bolts [E]
  Stem Head [F]



- Bend the claws [A] of the claw washer straighten.
- Remove the steering stem locknut [B] and claw washer.



- Adjust the steering.

  Special Tool - Steering Stem Nut Wrench [A]: 57001-1100

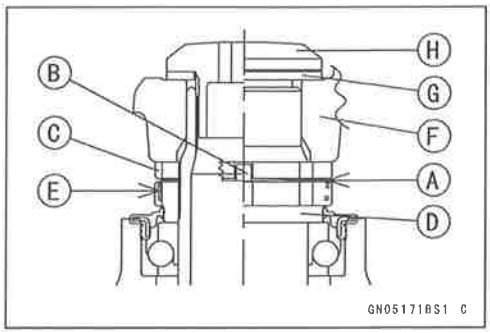
★If the steering is too tight, loosen the stem nut a fraction of a turn.

★If the steering is too loose, tighten the stem nut a fraction of a turn.

NOTE

○*Turn the stem nut 1/8 turn at time maximum.*

Periodic Maintenance Procedure



- Install the claw washer [A] so that its bent side [B] faces upward, and engage the bent claws with the grooves of stem locknut [C].
- Hand tighten the stem locknut until it touches the claw washer.
- Tighten the stem locknut clockwise until the claws are aligned with the grooves (ranging from 2nd to 4th) of stem nut [D], and bend the 2 claws downward [E].
- Install the stem head [F].
- Install the washer [G], and tighten the stem head nut [H].
- Tighten:

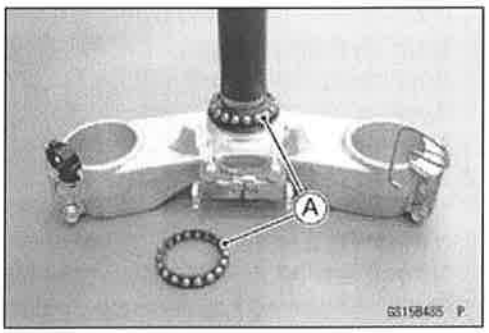
Torque - Steering Stem Head Bolt: 110 N·m (11.2 kgf·m, 81.1 ft·lb)
Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 15 ft·lb)
Clutch Hose Clamp Bolt: 8.0 N·m (0.82 kgf·m, 71 in·lb)
Brake Hose Clamp Bolt: 8.0 N·m (0.82 kgf·m, 71 in·lb)

- Check the steering again.

★If the steering is still too tight or too loose, repeat the adjustment.

- Install the handlebars (see Handlebar Installation in the Steering chapter).

Steering Stem Bearing Lubrication



- Remove the steering stem (see Stem, Stem Bearing Removal in the Steering chapter).
- Using a high flash-point solvent, wash the upper and lower ball bearings in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean off grease and dirt.
- Visually check the outer races and the ball bearings.

★Replace the bearing assemblies if they show wear or damage.

- Pack the upper and lower ball bearings [A] in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem (see Stem, Stem Bearing Installation in the Steering chapter).
- Adjust the steering (see Steering Play Adjustment).

Periodic Maintenance Procedure

Electrical System

Lights and Switches Operation Inspection

First Step

- Set the gear position in the neutral position.
- Push and turn the key knob to "ON."
- The following lights should go on according to below table.

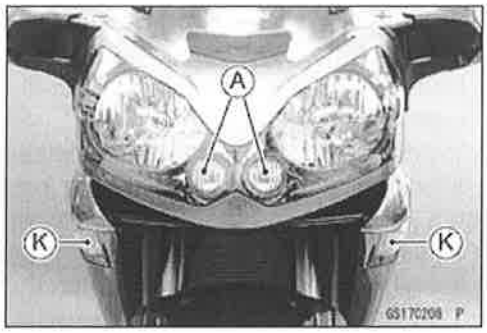
City Lights [A]	goes on
Taillight (LED) [B]	goes on
License Plate Light [C]	goes on
Meter Panel Illumination Light (LED) [D]	goes on
Meter Panel LCD [E]	goes on
Red Warning/Immobilizer Indicator Light (LED) [F]	goes on (for 5 seconds)
Green Neutral Indicator Light (LED) [G]	goes on
Red Oil Pressure Warning Indicator Light (LED) [H]	goes on
Yellow K-ACT ABS Indicator Light (LED) [I]	goes on
Yellow KTRC Indicator Light (LED) [J]	blinks
All Turn Signal Lights [K] and Green Turn Signal Indicator Lights (LED) [L]	blink two times

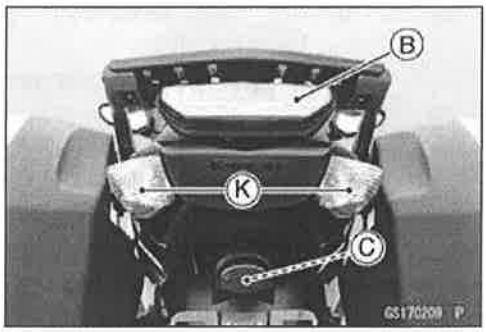
★If the light does not go on, inspect or replace the following item.

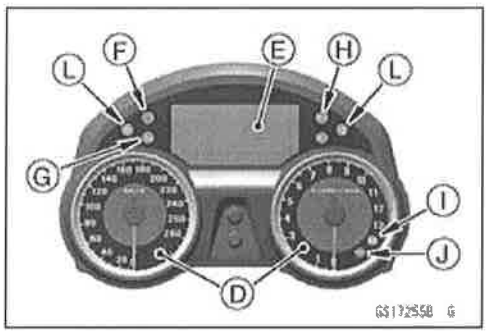
Battery (see Charging Condition Inspection in the Electrical System chapter)
Applicable Bulb (see Wiring Diagram in the Electrical System chapter)
Meter Unit (see Meter Unit Inspection in the Electrical System chapter)
ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)
Main Fuse 30 A, KIPASS Signal Relay Fuse 10 A and Taillight Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Steering Lock Unit (see Steering Lock Unit Replacement in the Electrical System chapter)
Gear Position Switch (see Gear Position Switch Inspection in the Electrical System chapter)
KIPASS Signal Relay (see KIPASS Signal Relay Inspection in the Electrical System chapter)
KIPASS Signal Diode (see KIPASS Signal Diode Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

- Turn the key knob to "OFF."
- All turn signal lights and indicator light (LED) flash one time then all lights should go off.

★If the light does not go off, replace the steering lock unit.







Periodic Maintenance Procedure

Second Step

- Push and turn the key knob to "ON."
- Turn on the turn signal switch [A] (left or right position).
- The left or right turn signal lights [B] (front and rear) according to the switch position should blink.
- The either of green turn signal indicator lights (LED) [C] in the meter unit should blink.

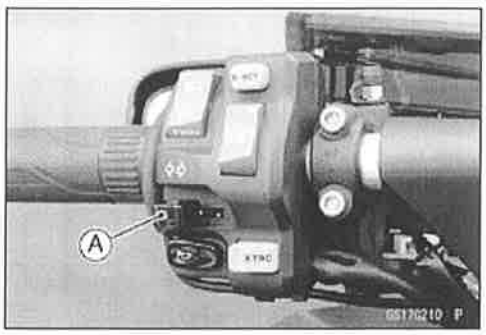
★If the each light does not blink, inspect or replace the following item.

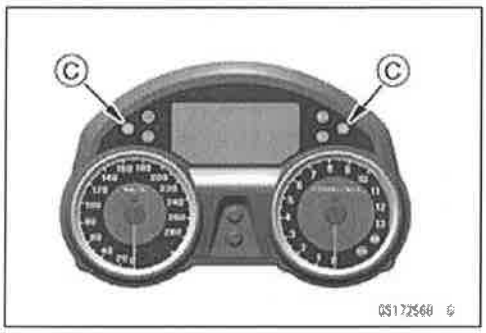
Turn Signal Light Bulb (see Turn Signal Light Bulb Replacement in the Electrical System chapter)
Green Turn Signal Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)
Turn Signal Relay Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Turn Signal Switch (see Switch Inspection in the Electrical System chapter)
Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

- Push the turn signal switch.
- The turn signal lights and green turn signal indicator light (LED) should go off.

★If the light does not go off, inspect or replace the following item.

Turn Signal Switch (see Switch Inspection in the Electrical System chapter)
Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)



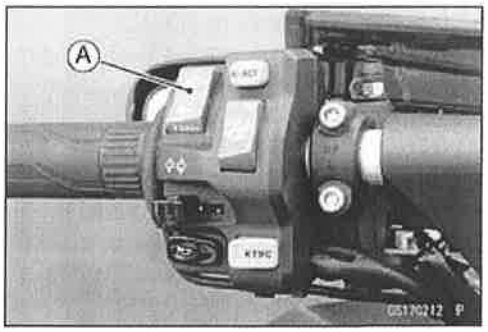


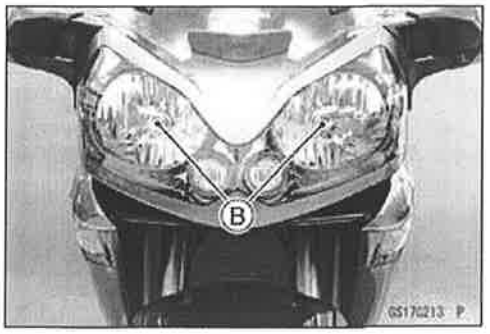
Third Step

- Set the dimmer switch [A] to low beam position.
- Start the engine.
- The low beam headlights [B] should go on.

★If the low beam headlight does not go on, inspect or replace the following item.

Headlight Bulb (see Headlight Bulb Replacement in the Electrical System chapter)
Headlight Fuse (Low) 15 A (see Fuse Inspection in the Electrical System chapter)
Headlight Relay Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Headlight Circuit Relay in Relay Box (see Relay Circuit Inspection in the Electrical System chapter)
Headlight Relay (Low) (see Headlight Relay Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

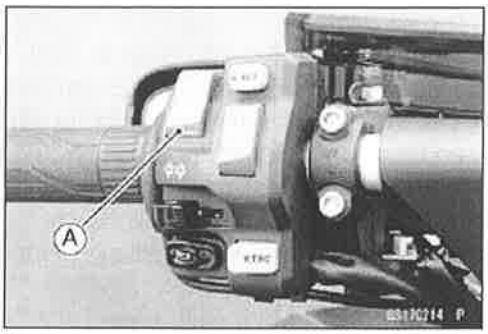


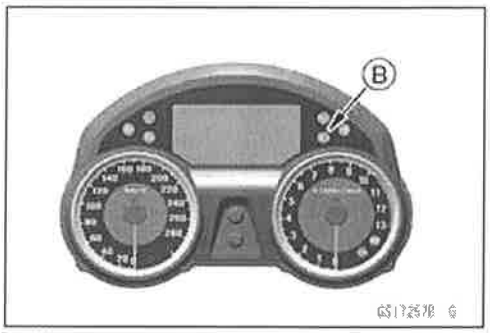


Periodic Maintenance Procedure

- Push the passing button [A] or set the dimmer switch to high beam position.
- The high beam headlights should go on.
- The blue high beam indicator light (LED) [B] should goes on.

★If the high beam headlight and/or blue high beam indicator light (LED) does not go on, inspect or replace the following item.
Headlight Bulb (see Headlight Bulb Replacement in the Electrical System chapter)
Headlight Fuse (High) 15 A (see Fuse Inspection in the Electrical System chapter)
Headlight Relay Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Passing Button (see Switch Inspection in the Electrical system chapter)
Dimmer Switch (see Switch Inspection in the Electrical System chapter)
Headlight Circuit Relay in Relay Box (see Relay Circuit Inspection in the Electrical System chapter)
Headlight Relay (High) (see Headlight Relay Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

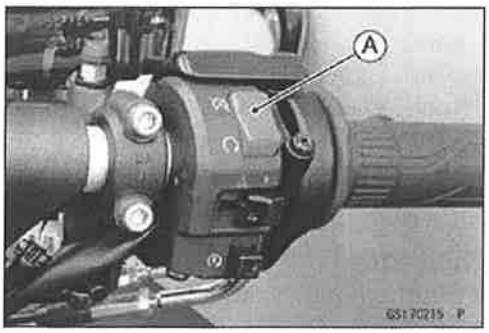




- Turn the engine stop switch [A] to stop position.
- The low beam or high beam headlights should stay going on.

★If the headlights and blue high beam indicator light (LED) go off, inspect or replace the following item.
Headlight Circuit Relay in Relay Box (see Relay Circuit Inspection in the Electrical System chapter)

- Turn the key knob to "OFF."
- The headlights and blue high beam indicator light (LED) should go off.



Headlight Aiming Inspection

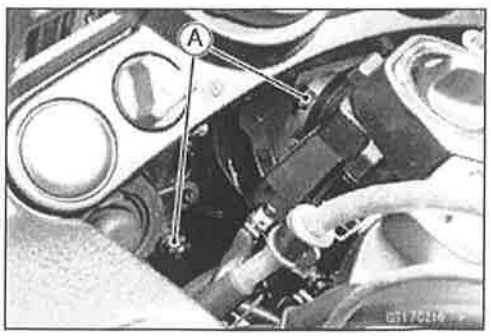
- Inspect the headlight beam for aiming.

★If the headlight beam points to one side rather than straight ahead, adjust the horizontal beam.

Headlight Beam Horizontal Adjustment

- Turn the horizontal adjuster [A] in both headlights in or out until the beam points straight ahead.

★If the headlight beam points too low or high, adjust the vertical beam.



Periodic Maintenance Procedure

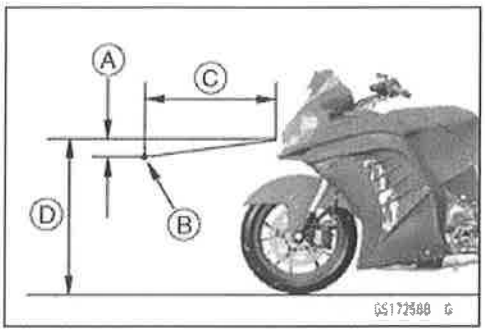
Headlight Beam Vertical Adjustment

- Turn the vertical adjuster [A] in both headlights in or out to adjust the headlight vertically.

NOTE

○*ON high beam, the brightest points should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.*

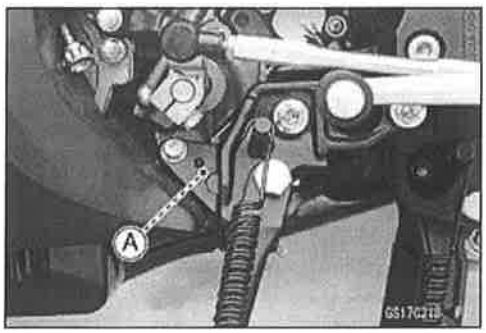
○*For US model, the proper angle is 0.4 degrees below horizontal. This is 50 mm (2.0 in.) drop at 7.6 m (25 ft) measured from the center of the headlight with the motorcycle on its wheels and the rider seated.*



50 mm (2.0 in.) [A]
Center of Brightest Spot [B]
7.6 m (25 ft) [C]
Height of Headlight Center [D]

Side Stand Switch Operation Inspection

- Inspect the side stand switch [A] operation accordance to table the below.



Side stand Switch Operation

Side stand	Gear Position	Clutch Lever	Engine Start	Engine Run
Up	Neutral	Released	Starts	Continue running
Up	Neutral	Pulled in	Starts	Continue running
Up	In Gear	Released	Does not start	Continue running
Up	In Gear	Pulled in	Starts	Continue running
Down	Neutral	Released	Starts	Continue running
Down	Neutral	Pulled in	Starts	Continue running
Down	In Gear	Released	Does not start	Stops
Down	In Gear	Pulled in	Does not start	Stops

★If the side stand switch operation does not work, inspect or replace the following item.
Battery (see Charging Condition Inspection in the Electrical System chapter)
Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)
Ignition Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
Steering Lock Unit (see Steering Lock Unit Replacement in the Electrical System chapter)
Side Stand Switch (see Switch Inspection in the Electrical System chapter)
Starter Lockout Switch (see Switch Inspection in the Electrical System chapter)
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)
Starter Button (see Switch Inspection in the Electrical System chapter)
Gear Position Switch (see Gear Position Switch Inspection in the Electrical System chapter)
Starter Relay (see Starter Relay Inspection in the Electrical System chapter)
Relay Box (see Relay Circuit Inspection in the Electrical System chapter)
Starter Circuit Relay (see Relay Circuit Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

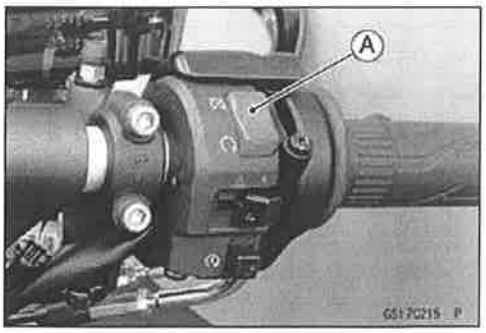
★If the all parts are in good condition, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Engine Stop Switch Operation Inspection

First Step

- Push and turn the key knob to "ON."
- Set the gear position in the neutral position.
- Turn the engine stop switch to stop position [A].
- Push the starter button.
- The engine does not start.

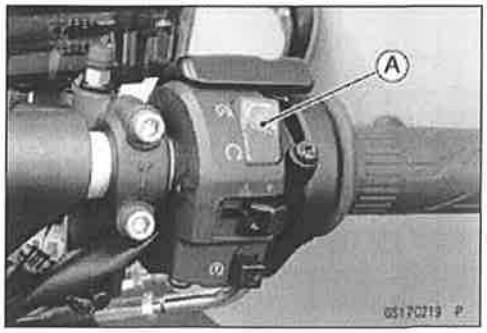
★If the engine starts, inspect or replace the following item.
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)



Second Step

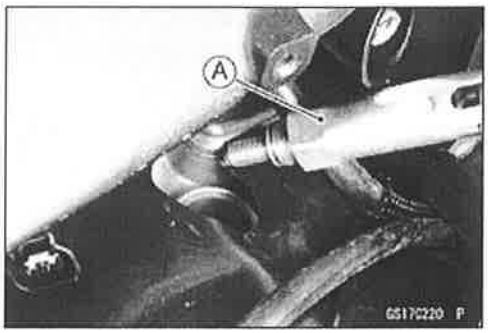
- Push and turn the key knob to "ON."
- Set the gear position in the neutral position.
- Turn the engine stop switch to run position [A].
- Push the starter button and start the engine.
- Turn the engine stop switch to stop position.
- Immediately the engine should be stop.

★If the engine does not stop, inspect or replace the following item.
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)



Periodic Maintenance Procedure

Spark Plug Replacement



- Remove:
  Stick Coils (see Stick Coil Removal in the Electrical System chapter)
- Remove the spark plug using the 16 mm (0.63 in.) plug wrench [A] vertically.

- Replace the spark plugs with new ones.

Standard Spark Plug
Type: NGK CR9EIA-9

- Insert the spark plug vertically into the spark plug hole with the spark plug installed in the plug wrench [A], and finger-tighten it first.

NOTICE
If tightening the spark plug with the wrench inclined, the insulator of the spark plug may break.

- Tighten:

Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 115 in·lb)

- Install the stick coils (see Stick Coil Installation in the Electrical System chapter).
- Be sure the stick coils are installed by pulling up it lightly.

Others

Chassis Parts Lubrication

- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

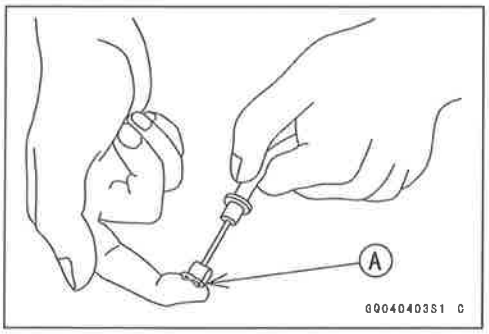
NOTE

○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.*

Pivots: Lubricate with Grease.
Brake Lever
Brake Pedal
Clutch Lever
Center Stand
Rear Brake Joint Pin
Side Stand

Periodic Maintenance Procedure

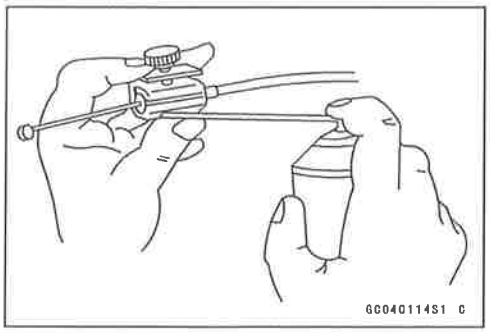
Points: Lubricate with Grease.
Throttle Inner Cable Upper and Lower Ends [A]



Cables: Lubricate with Rust Inhibitor.
Throttle Cables

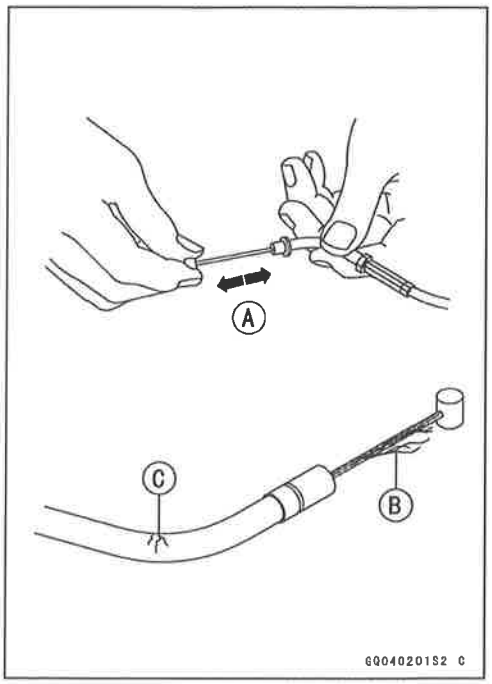
- Lubricate the cables by seeping the oil between the cable and housing.

○The cable may be lubricated by using a commercially available pressure cable lubricator with an aerosol cable lubricant.



- With the cable disconnected at both ends, the inner cable should move freely [A] within the cable housing.

★If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.



Periodic Maintenance Procedure

Bolts, Nuts and Fasteners Tightness Inspection

- Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

NOTE

○*For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).*

★If there are loose fasteners, retorque them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by 1/2 turn, then tighten it.

★If cotter pins are damaged, replace them with new ones.

Bolt, Nut and Fastener to be checked

Engine:
- Clutch Lever Pivot Bolt Locknut
- Engine Mounting Bolts and Nut
- Muffler Clamp Bolts
- Exhaust Pipe Manifold Holder Nuts
- Muffler Body Mounting Bolts

Wheels:
- Front Axle Clamp Bolts
- Front Axle Nut
- Rear Axle Nut
- Rear Axle Nut Cotter Pin
- Final Gear Case and Axle Bracket Locknuts
- Torque Rod Nut

Brakes:
- Brake Lever Pivot Nut
- Brake Pedal Bolt
- Brake Rod Joint Cotter Pin
- Caliper Mounting Bolts
- Front Master Cylinder Clamp Bolts
- Rear Master Cylinder Mounting Bolts

Suspension:
- Front Fork Clamp Bolts
- Rear Shock Absorber Nuts
- Swingarm Pivot Shaft Nut
- Rocker Arm Nut
- Tie-Rod Nuts
- Torque Rod Locknuts

Steering:
- Handlebar Bolts
- Handlebar Holder Bolts
- Steering Stem Head Bolt

Others:
- Center Stand Bolts
- Footpeg Bracket Bolts
- Side Stand Bolt

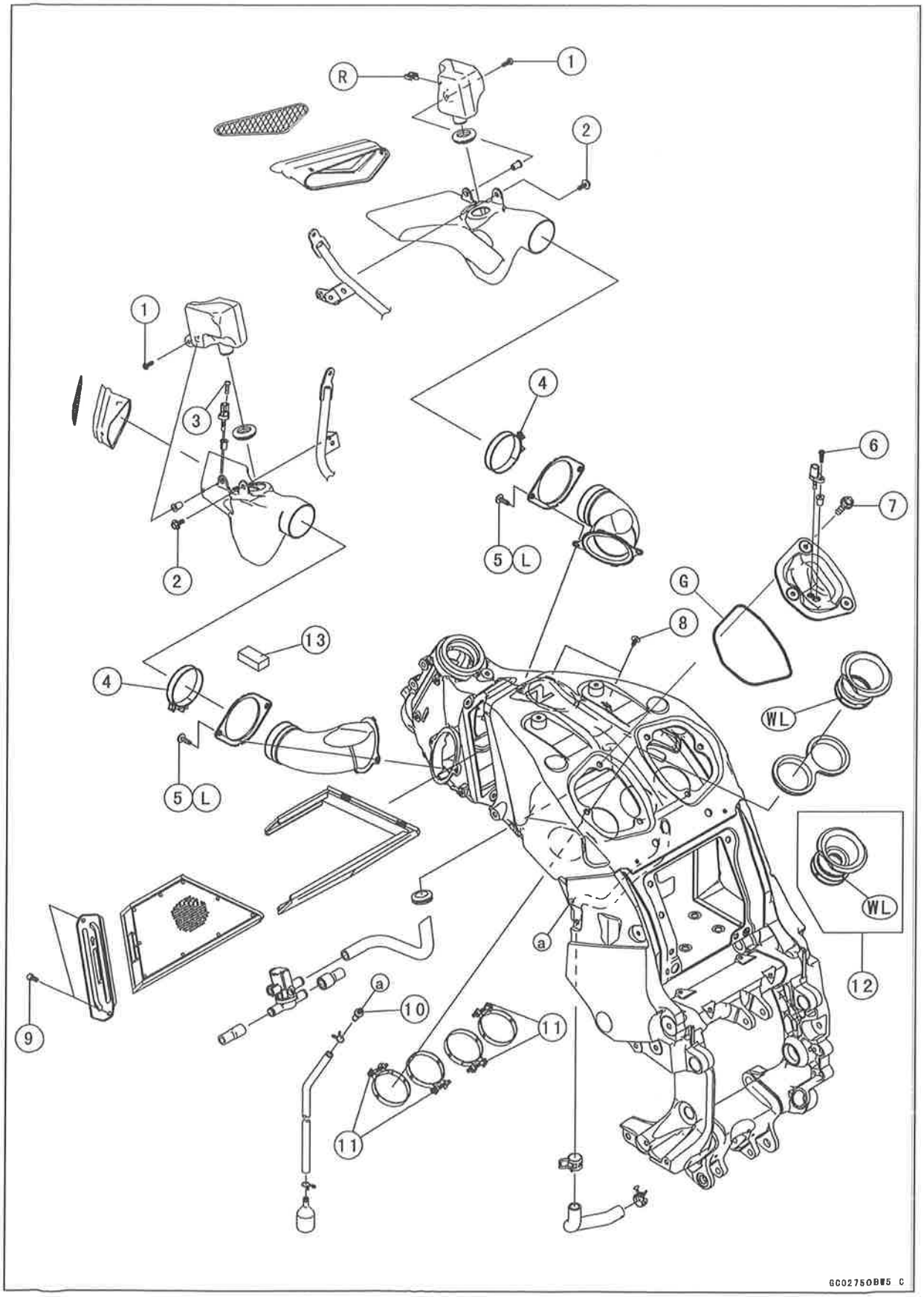
Fuel System (DFI)

Table of Contents

Exploded View 3-2
DFI System 3-8
DFI Components Naming 3-10
DFI Parts Location 3-16
Specifications 3-18
Special Tools and Sealant 3-19
DFI Servicing Precautions 3-20
DFI Servicing Precautions 3-20
Troubleshooting the DFI System 3-22
Outline 3-22
Inquiries to Rider 3-27
DFI System Troubleshooting Guide 3-30
Red Warning/Immobilizer Indicator Light (LED) 3-35
Red Warning/Immobilizer Indicator Light (LED) Inspection 3-35
ECU 3-36
ECU Identification 3-36
ECU Removal 3-36
ECU Installation 3-37
ECU Power Supply Inspection 3-38
CAN Communication Line 3-41
CAN Communication Line Resistance Inspection 3-41
DFI Power Source 3-43
ECU Fuse Removal 3-43
ECU Fuse Installation 3-43
ECU Fuse Inspection 3-43
ECU Main Relay Removal/Installation 3-43
ECU Main Relay Inspection 3-43
Fuel Line 3-44
Fuel Pressure Inspection 3-44
Fuel Flow Rate Inspection 3-46
Fuel Pump 3-48
Fuel Pump Removal 3-48
Fuel Pump Installation 3-48
Fuel Pump Operation Inspection 3-49
Fuel Pump Operating Voltage Inspection 3-49
Pressure Regulator Removal 3-50
Fuel Pump Screen, Fuel Filter Cleaning 3-51
Fuel Filter Replacement 3-51
Fuel Injectors 3-55
Fuel Injector Removal/Installation 3-55
Fuel Injector Audible Inspection 3-55
Fuel Injector Resistance Inspection 3-55
Fuel Injector Power Source Voltage Inspection 3-56
Fuel Injector Output Voltage Inspection 3-57
Fuel Injector Fuel Line Inspection 3-58
Throttle Grip and Cables 3-60
Throttle Grip Free Play Inspection 3-60
Throttle Grip Free Play Adjustment 3-60
Throttle Cable Installation 3-60
Cable Lubrication 3-60
Throttle Body Assy 3-61
Idle Speed Inspection/Adjustment 3-61
Synchronization Inspection/Adjustment 3-61
Throttle Body Assy Removal 3-61
Throttle Body Assy Installation 3-65
Throttle Body Assy Disassembly 3-68
Throttle Body Assy Assembly 3-69
Air Cleaner 3-71
Air Cleaner Element Removal/Installation 3-71
Air Cleaner Element Inspection 3-71
Air Cleaner Element Holder Removal 3-71
Air Cleaner Element Holder Installation 3-71
Air Cleaner Oil Draining 3-72
Air Line 3-73
Rear Air Intake Duct Removal 3-73
Rear Air Intake Duct Installation 3-74
Front Air Intake Duct Removal 3-75
Front Air Intake Duct Installation 3-76
Fuel Tank 3-77
Fuel Tank Removal 3-77
Fuel Tank Installation 3-80
Fuel Tank and Cap Inspection 3-82
Fuel Tank Cleaning 3-82
Evaporative Emission Control System (CAL, CN, SEA-B1 and TH Models) 3-83
Parts Removal/Installation 3-83
Hose Inspection 3-83
Separator Inspection 3-83
Separator Operation Test 3-84
Canister Inspection 3-84

3-2 FUEL SYSTEM (DFI)

Exploded View



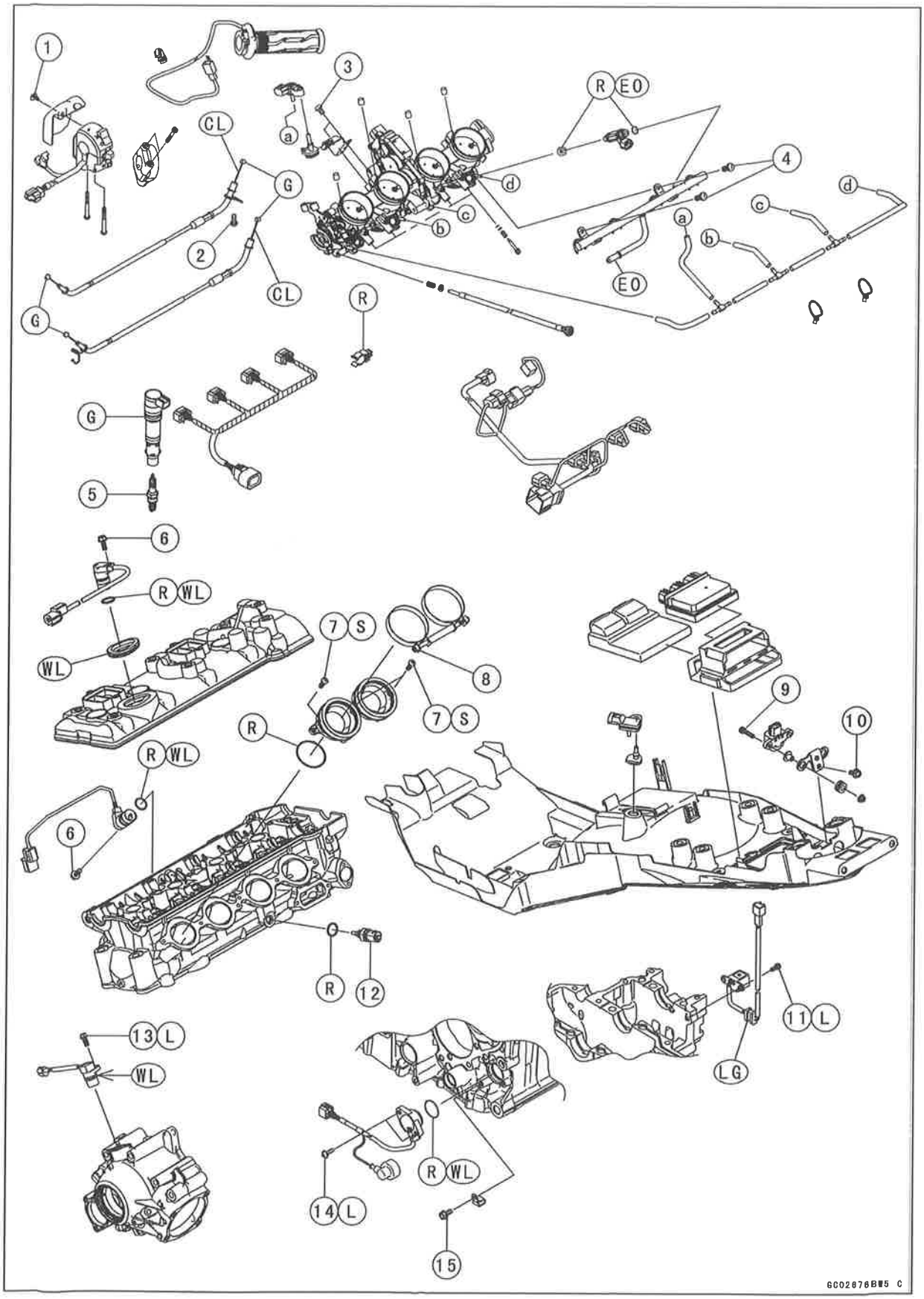
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Resonator Mounting Bolts	3.9	0.40	35 in·lb	
2	Front Air Intake Duct Mounting Bolts	3.9	0.40	35 in·lb	
3	Outside Temperature Sensor Screw	0.50	0.05	4.4 in·lb	
4	Air Intake Duct Clamp Bolts	6.9	0.70	61 in·lb	
5	Rear Air Intake Duct Mounting Bolts	9.8	1.0	87 in·lb	L
6	Intake Air Temperature Sensor Screw	0.50	0.05	4.4 in·lb	
7	Air Cleaner Cap Bolts	8.0	0.82	71 in·lb	
8	Air Cleaner Element Holder Screws	6.9	0.70	61 in·lb	
9	Air Cleaner Element Cover Bolts	9.8	1.0	87 in·lb	
10	Drain Hose Fitting	20	2.0	15	
11	Duct Clamp Bolts	2.0	0.20	18 in·lb	

12. WVTA (78.2) Model
13. Frame No. ~ 001692

G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
WL: Apply a soap and water solution or rubber lubricant.

Exploded View

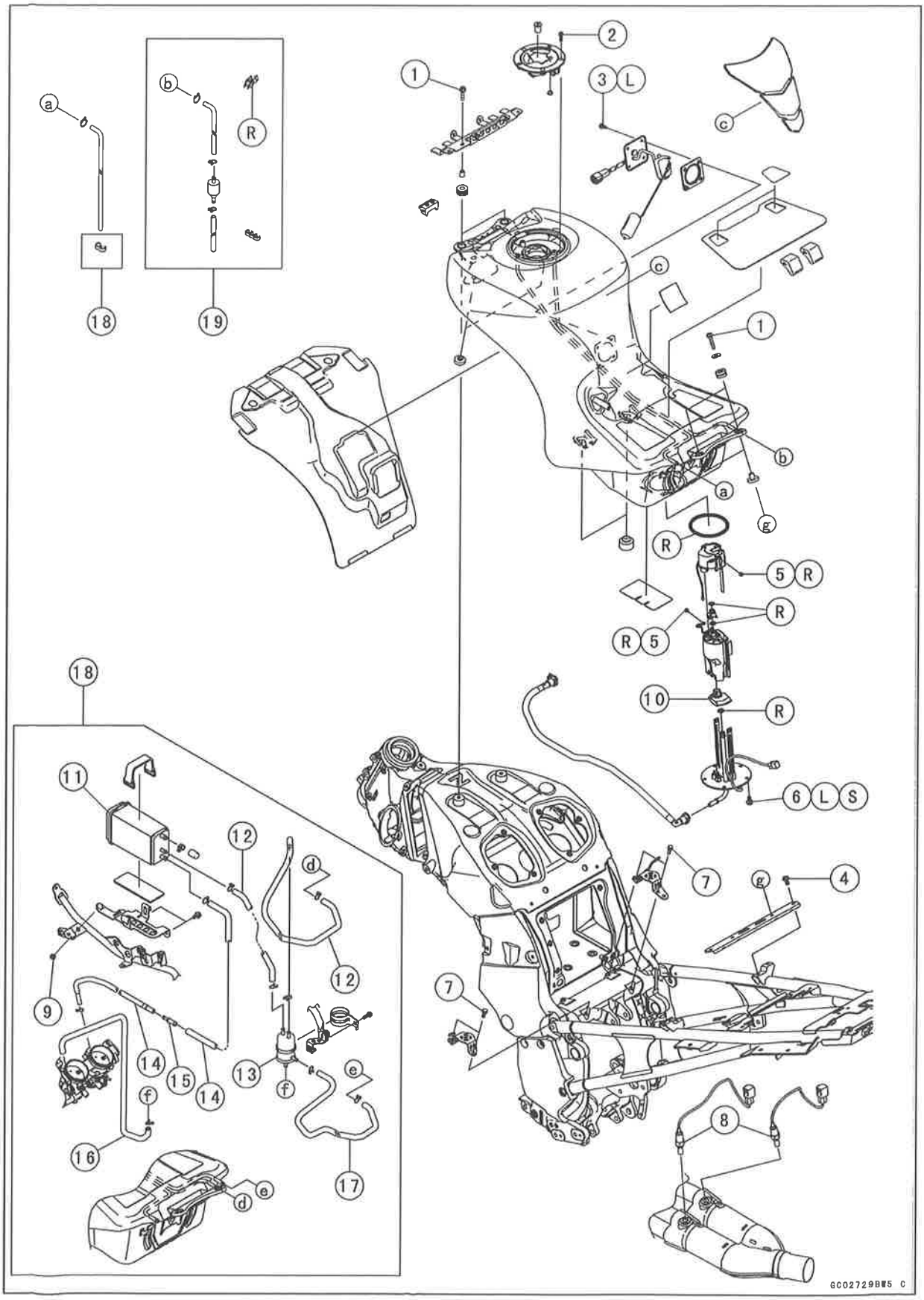


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Throttle Case Cover Screw	3.0	0.31	27 in·lb	
2	Throttle Cable Mounting Screw	4.0	0.41	35 in·lb	
3	Intake Air Pressure Sensor Bracket Screws	3.5	0.36	31 in·lb	
4	Delivery Pipe Mounting Screws	5.0	0.51	44 in·lb	
5	Spark Plugs	13	1.3	115 in·lb	
6	Camshaft Position Sensor Bolts	9.8	1.0	87 in·lb	
7	Throttle Body Assy Holder Bolts	9.8	1.0	87 in·lb	S
8	Throttle Body Assy Holder Clamp Bolts	2.0	0.20	18 in·lb	
9	Vehicle-down Sensor Bolts	5.9	0.60	52 in·lb	
10	Vehicle-down Sensor Bracket Bolt	4.0	0.41	35 in·lb	
11	Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	L
12	Water Temperature Sensor	12	1.2	106 in·lb	
13	Speed Sensor Bolt	9.8	1.0	87 in·lb	L
14	Gear Position Switch Screws	2.9	0.30	26 in·lb	L
15	Gear Position Switch Lead Clamp Mounting Bolt	9.8	1.0	87 in·lb	

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
R: Replacement Parts
S: Follow the specified tightening sequence.
WL: Apply soap and water solution or rubber lubricant.

Exploded View



Exploded View

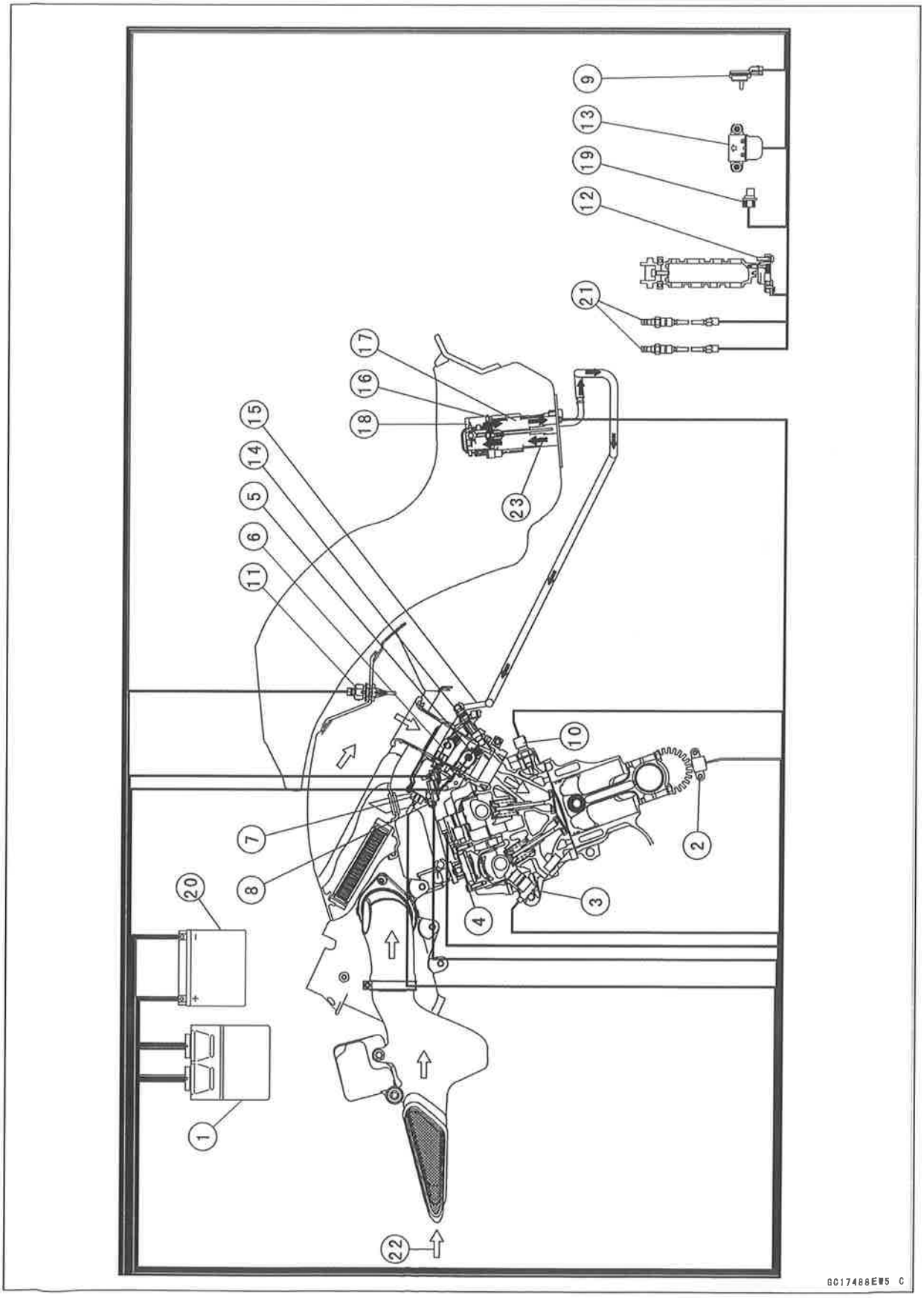
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel Tank Bolts	8.0	0.82	71 in·lb	
2	Fuel Tank Cap Bolts	4.5	0.46	40 in·lb	
3	Fuel Level Sensor Bolts	7.0	0.71	62 in·lb	L
4	Fuel Tank Bracket Bolts	8.0	0.82	71 in·lb	
5	Fuel Pump Assembly Screws	0.98	0.10	8.7 in·lb	R
6	Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
7	Bracket Bolts	8.0	0.82	71 in·lb	
8	Oxygen Sensors	25	2.5	18	
9	Canister Bracket Nut	7.0	0.71	62 in·lb	

10. Fuel Filter
11. Canister
12. Blue Hose
13. Separator
14. Green Hose
15. Fitting
16. White Hose
17. Red Hose
18. CAL, TH and SEA-B1 Models
19. Other than CAL, TH and SEA-B1 Models

EO: Apply engine oil.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.

DFI System

DFI System



DFI System

1. ECU
2. Crankshaft Sensor
3. Exhaust Camshaft Position Sensor
4. Intake Camshaft Position Sensor
5. Main Throttle Sensor
6. Subthrottle Sensor
7. Subthrottle Valve Actuator
8. Intake Air Pressure Sensor
9. Atmospheric Pressure Sensor
10. Water Temperature Sensor
11. Intake Air Temperature Sensor
12. Gear Position Switch
13. Vehicle-down Sensor
14. Fuel Injectors
15. Delivery Pipe
16. Pressure Regulator
17. Fuel Pump
18. Fuel Filter
19. Speed Sensor
20. Battery 12 V 14 Ah
21. Oxygen Sensors
22. Air Flow
23. Fuel Flow

DFI System

DFI Components Naming

The terms used in the European regulation for DFI components are sometimes different from those used by Kawasaki. Use this table to cross reference terms which may appear in a generic scan tool when diagnosing the DFI system.

Sensors Described in R44/2014	Kawasaki Name
Barometric pressure sensor	Intake air pressure sensor #2
Crankshaft position sensor	Crankshaft sensor
Engine coolant temperature sensor	Water (Engine) temperature sensor
Intake air temperature sensor	Intake air temperature sensor
Manifold absolute pressure sensor	Intake air pressure sensor #1
O_2 sensor	Oxygen sensor
Throttle position sensor Sub	Subthrottle sensor
Throttle position sensor (Sensor A)	Main throttle sensor
Vehicle speed sensor	Rear wheel rotation sensor
Wheel speed sensor	Front wheel rotation sensor

Actuators Described in R44/2014	Kawasaki Name
Evaporative emission system purge control valve	Purge valve
Fuel injector	Fuel injector
Ignition coil primary control circuits	Ignition coil (Stick coil)
O_2 sensor heater	Oxygen sensor heater
Secondary air injection system	Air switching valve
Throttle by wire actuator	Subthrottle valve actuator (ETV actuator)

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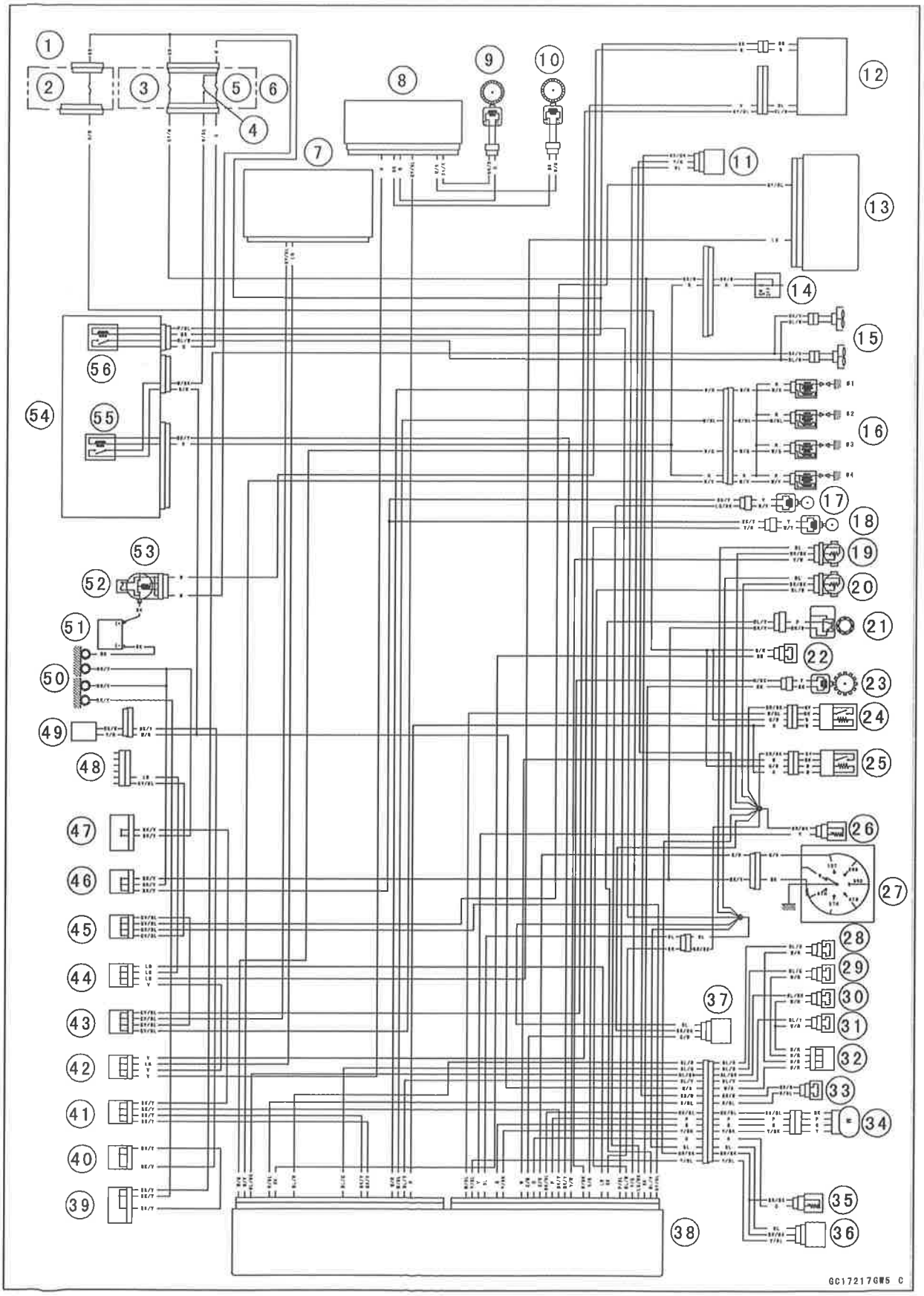
DFI System



Part Name

DFI System

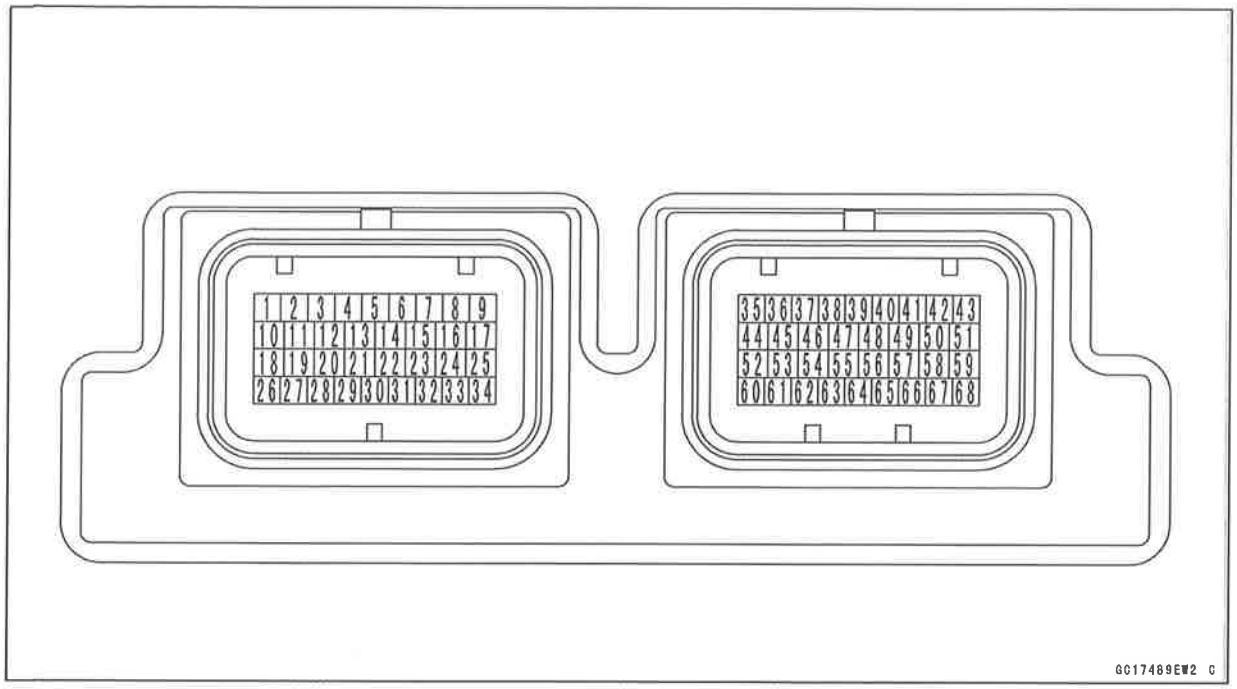
1. Fuse Box 3
2. Oil Control Solenoid Valve Fuse 15 A
3. Ignition Fuse 15 A
4. ECU Fuse 15 A
5. Fan Fuse 15 A
6. Fuse Box 2
7. Meter Unit
8. K-ACT ABS Hydraulic Unit
9. Front Wheel Rotation Sensor
10. Rear Wheel Rotation Sensor
11. Vehicle-down Sensor
12. Steering Lock Unit
13. KIPASS ECU
14. Engine Stop Switch
15. Fan Motors
16. Stick Coils #1, #2, #3, #4
17. Exhaust Camshaft Position Sensor
18. Intake Camshaft Position Sensor
19. Main Throttle Sensor
20. Subthrottle Sensor
21. Speed Sensor
22. Oil Control Solenoid Valve
23. Crankshaft Sensor
24. Oxygen Sensor #1
25. Oxygen Sensor #2
26. Intake Air Temperature Sensor
27. Gear Position Switch
28. Fuel Injector #1
29. Fuel Injector #2
30. Fuel Injector #3
31. Fuel Injector #4
32. Joint Connector A
33. Air Switching Valve
34. Subthrottle Valve Actuator
35. Water Temperature Sensor
36. Intake Air Pressure Sensor
37. Atmospheric Pressure Sensor
38. ECU
39. Joint Connector 1
40. Joint Connector 2
41. Joint Connector 3
42. Joint Connector 4
43. Joint Connector 5
44. Joint Connector 6
45. Joint Connector 7
46. Joint Connector 8
47. Joint Connector 9
48. Kawasaki Diagnostic System Connector
49. Fuel Pump
50. Frame Grounds
51. Battery 12 V 14 Ah
52. Main Fuse 30 A
53. Starter Relay
54. Relay Box
55. Fuel Pump Relay
56. Fan Relay

○Color Codes:

BK: Black	DG: Dark Green	LG: Light Green	R: Red
BL: Blue	G: Green	O: Orange	V: Violet
BR: Brown	GY: Gray	P: Pink	W: White
CH: Chocolate	LB: Light Blue	PU: Purple	Y: Yellow

DFI System

Terminal Numbers of ECU Connectors



Terminal Names

1. Stick Coil #3: W/G
2. Stick Coil #4: W/Y
3. Fuel Injector #3: BL/BK
4. Electric Windshield Relay (Up): BR/W
5. Electric Windshield Relay (Down): BK/O
6. Air Switching Valve: R/BL
7. Oil Control Solenoid Valve: BK
8. Unused
9. Unused
10. Fuel Injector #1: BL/R
11. Unused
12. Unused
13. Unused
14. Unused
15. Unused
16. Unused
17. Unused
18. Fuel Injector #2: BL/G
19. Electric Windshield Switch (Up): O/G
20. Electric Windshield Switch (Down): R/BL
21. Engine Ground: BK/Y
22. Engine Ground: BK/Y
23. Ground: BK/BL
24. Ground: BK/G
25. Side Stand Switch: G/BK
26. Stick Coil #1: W/R
27. Stick Coil #2: W/BL
28. Fuel Injector #4: BL/Y
29. Oxygen Sensor Heater #1 and #2: R
30. Storage Case Solenoid: G/Y
31. Grip Warmer Relay: GY
32. Unused
33. Starter Lockout Switch: R/G
34. Starter Button: BK/R

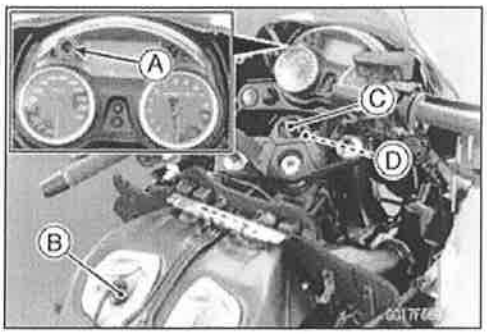
DFI System

35. Power Supply to ECU (from Steering Lock Unit): BR/BK
36. Unused
37. Oxygen Sensor #1: W/BL
38. Intake Air Pressure Sensor: Y/BL
39. Intake Air Temperature Sensor: Y
40. Power Supply to Sensors: BL
41. External Communication Line (*KDS): BL/O
42. Subthrottle Valve Actuator: G
43. Subthrottle Valve Actuator: Y/BK
44. Power Supply to ECU (from Battery): W/BK
45. Battery Monitor Voltage Line: W/R
46. Oxygen Sensor #2: W
47. Atmospheric Pressure Sensor: G/W
48. Water Temperature Sensor: O
49. Gear Position Switch: G/R
50. Subthrottle Valve Actuator: BK/BL
51. Subthrottle Valve Actuator: P
52. Ground for Control System: BK/Y
53. Fuel Pump Relay: BR/Y
54. Main Throttle Sensor: Y/W
55. Rear Wheel Rotation Sensor Signal: LG/R
56. Crankshaft Sensor (+): R/BK
57. Exhaust Camshaft Position Sensor: Y/R
58. Front Wheel Rotation Sensor Signal: R/W
59. CAN Communication Line (Low): LB
60. Ground for Sensors: BR
61. Unused
62. Radiator Fan Relay: P/BL
63. Subthrottle Sensor: BL/W
64. Vehicle-down Sensor: Y/G
65. Intake Camshaft Position Sensor: LG/BK
66. Crankshaft Sensor (–): BK
67. Speed Sensor: BL/Y
68. CAN Communication Line (High): GY/BL

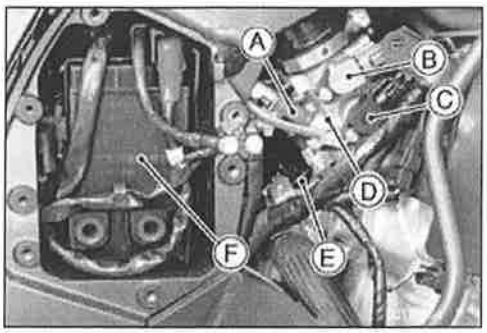
*: KDS (Kawasaki Diagnostic System)

DFI Parts Location

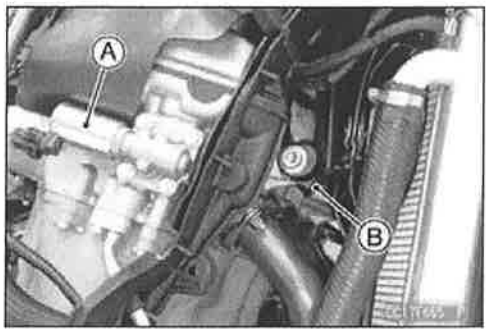
Red Warning/Immobilizer Indicator Light (LED) [A]
Intake Air Temperature Sensor [B]
Key Knob [C]
Steering Lock Unit [D]



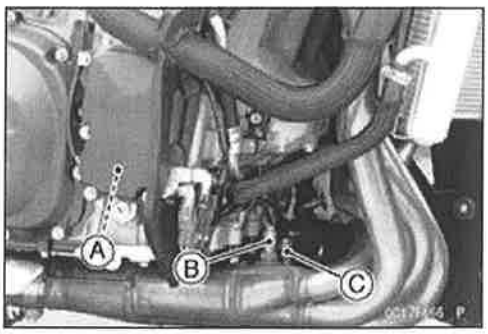
Right Side of Vehicle
Fuel Injectors #1, #2, #3, #4 [A]
Subthrottle Sensor [B]
Main Throttle Sensor [C]
Throttle Body Assy [D]
Water Temperature Sensor [E]
Battery 12 V 14 Ah [F]



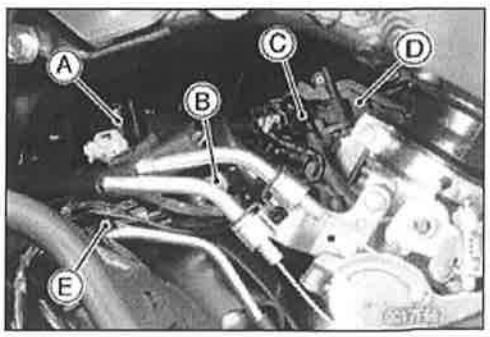
Right Side of Vehicle
Oil Control Solenoid Valve [A]
Exhaust Camshaft Position Sensor [B]



Right Side of Vehicle
Crankshaft Sensor [A]
Oxygen Sensor #1 [B]
Oxygen Sensor #2 [C]

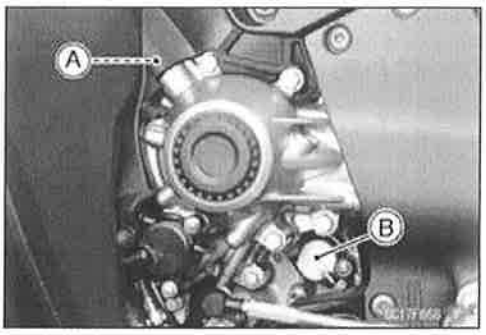


Left Side of Vehicle
Air Switching Valve [A]
Intake Camshaft Position Sensor [B]
Intake Air Pressure Sensor [C]
Subthrottle Valve Actuator [D]
Stick Coils #1, #2, #3, #4 [E]



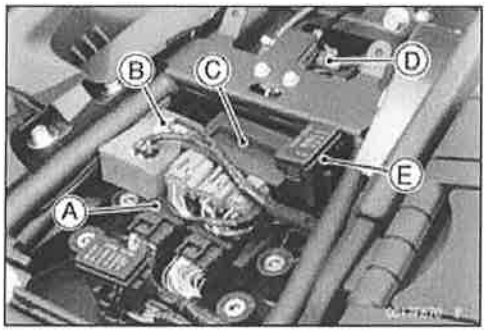
DFI Parts Location

Left Side of Vehicle
Speed Sensor [A]
Gear Position Switch [B]



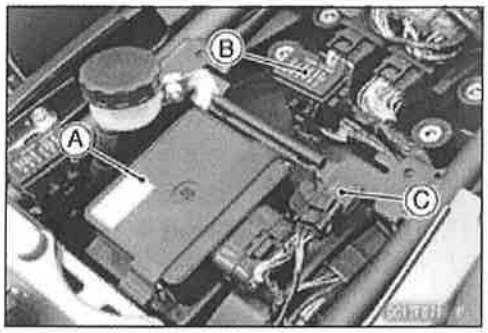
Under Seat
ECU [A]
KDS Connector [B]
Relay Box [C]
- Fuel Pump Relay
- Radiator Fan Relay

Vehicle-down Sensor [D]
Fuse Box 2 [E]
- Ignition Fuse 15 A
- ECU Fuse 15 A

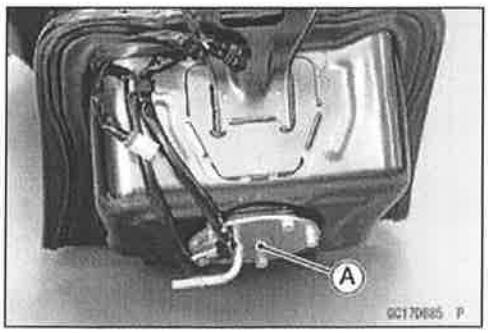


Under Seat
KIPASS ECU [A]
Fuse Box 3 [B]
- KIPASS Signal Relay Fuse 10 A
- KIPASS ECU Fuse 10 A
- Oil Control Solenoid Valve Fuse 15 A

Atmospheric Pressure Sensor [C]



Fuel Tank
Fuel Pump [A]

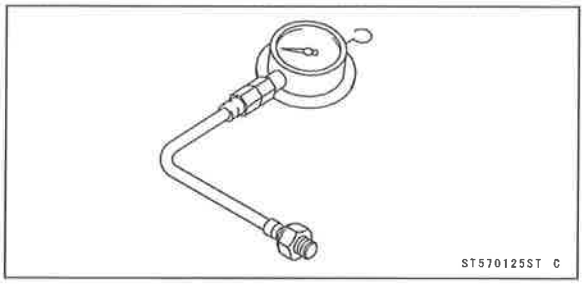


Specifications

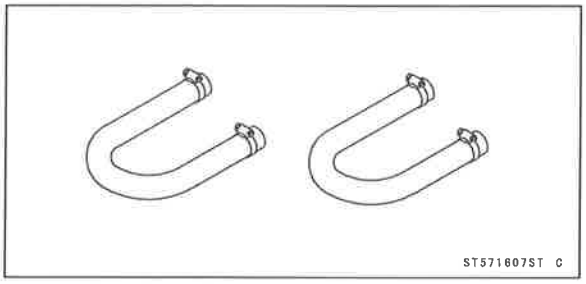
Item	Standard
Digital Fuel Injection System	
Idle Speed	1 100 ±50 r/min (rpm)
Throttle Body Assy:	
Throttle Valve	Dual throttle valve
Bore	ϕ40 mm (1.6 in.)
Throttle Body Vacuum	34.7 ±1.33 kPa (260 ±10 mmHg) at idle speed
Bypass Screws (Turn Out)	– – –
ECU:	
Make	MITSUBISHI ELECTRIC
Type	Digital memory type, with built in IC igniter, sealed with resin
Fuel Pressure (High Pressure Line)	294 kPa (3.0 kgf/cm², 43 psi) with engine idling
Fuel Pump:	
Type	In-tank pump (in fuel tank)
Discharge	67 mL (2.3 US oz.) or more for 3 seconds
Fuel Injectors:	
Type	INP-287
Nozzle Type	Fine atomizing type with 12 holes
Resistance	About 11.7 ~ 12.3 Ω @20°C (68°F)
CAN Communication Line:	
Resistance	123 ~ 125 Ω at ECU Connector 114 ~ 126 Ω at KIPASS ECU Connector
Throttle Grip and Cables	
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
Air Cleaner	
Air Cleaner Element	Viscous paper element

Special Tools and Sealant

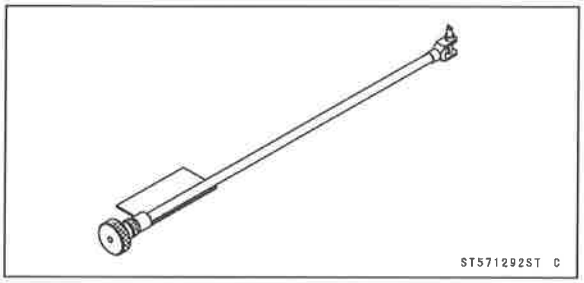
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



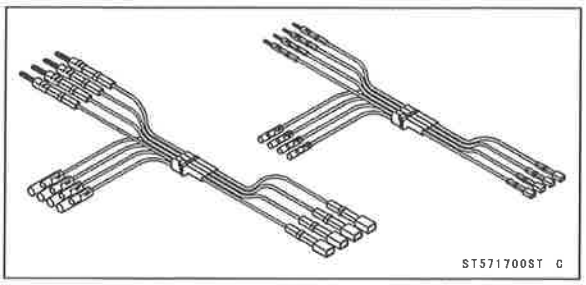
Fuel Hose:
57001-1607



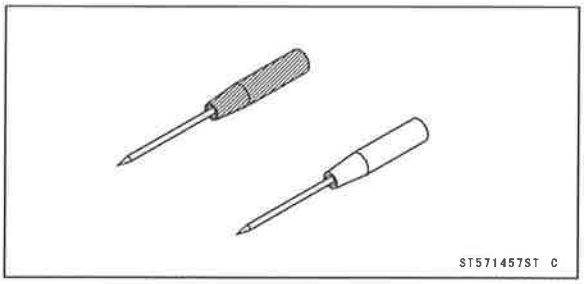
Pilot Screw Adjuster, C:
57001-1292



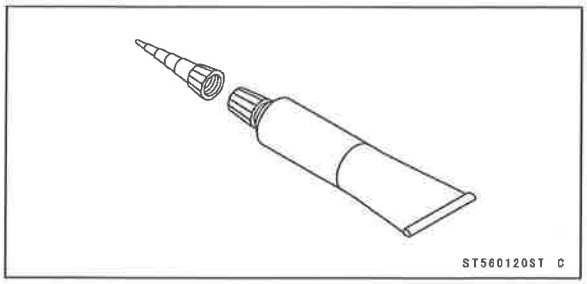
Measuring Adapter:
57001-1700



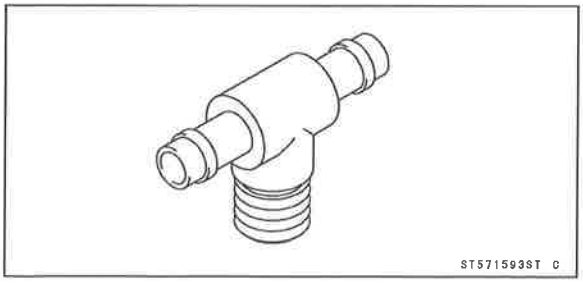
Needle Adapter Set:
57001-1457



Liquid Gasket, TB1211:
56019-120



Fuel Pressure Gauge Adapter:
57001-1593



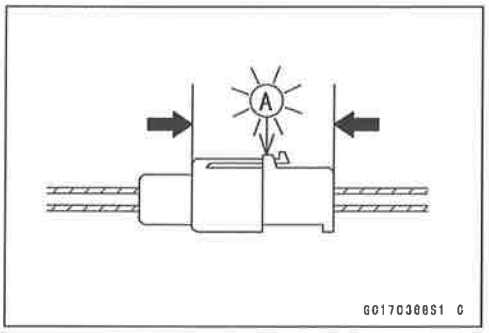
DFI Servicing Precautions

DFI Servicing Precautions

There are a number of important precautions that should be followed servicing the DFI system.

- This DFI system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the DFI parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- When charging, remove the battery from the motorcycle. This is to prevent ECU damage by excessive voltage.

- Whenever the DFI electrical connections are to be disconnected, first turn off the ignition switch, and disconnect the battery (–) terminal. Do not pull the lead, only the connector. Conversely, make sure that all the DFI electrical connections are firmly reconnected before starting the engine.
- Connect these connectors until they click [A].

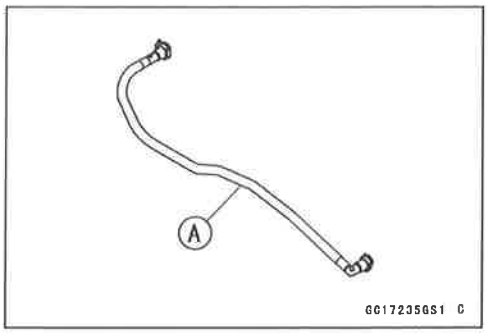


- Do not push and turn the key knob to "ON" while any of the DFI electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, DFI parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the DFI system is not influenced by electric wave radiated from the antenna. Check operation of the system with the engine at idle. Locate the antenna as far as possible away from the ECU.
- When any fuel hose is disconnected, do not turn on the ignition switch. Otherwise, the fuel pump will operate and fuel will spout from the fuel hose.
- Do not operate the fuel pump if the pump is completely dry. This is to prevent pump seizure.
- Before removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- When any fuel hose is disconnected, fuel may spout out by residual pressure in the fuel line. Cover the hose joint with a piece of clean cloth to prevent fuel spillage.
- When installing the fuel hoses, avoid sharp bending, kinking, flattening or twisting, and run the fuel hoses with a minimum of bending so that the fuel flow will not be obstructed.
- Run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- To prevent corrosion and deposits in the fuel system, do not add to fuel any fuel antifreeze chemicals.

DFI Servicing Precautions

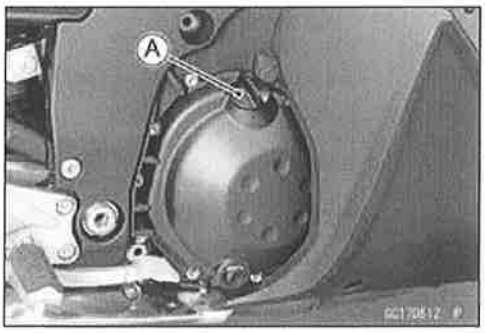
○If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak or the hose to burst. Remove the fuel tank (see Fuel Tank Removal) and check the fuel hose [A].

★Replace the fuel hose if any fraying, cracks or bulges are noticed.



○To maintain the correct fuel/air mixture (F/A), there must be no intake air leaks in the DFI system. Be sure to install the oil filler cap [A] after filling the engine oil.

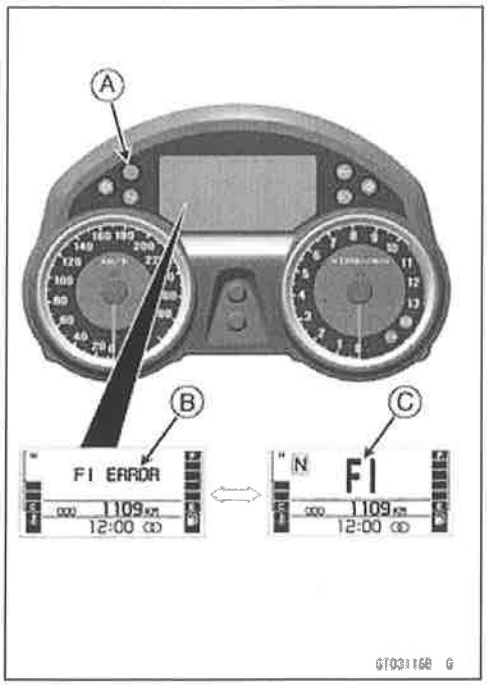
Torque - Oil Filler Cap: Hand-tighten



Troubleshooting the DFI System

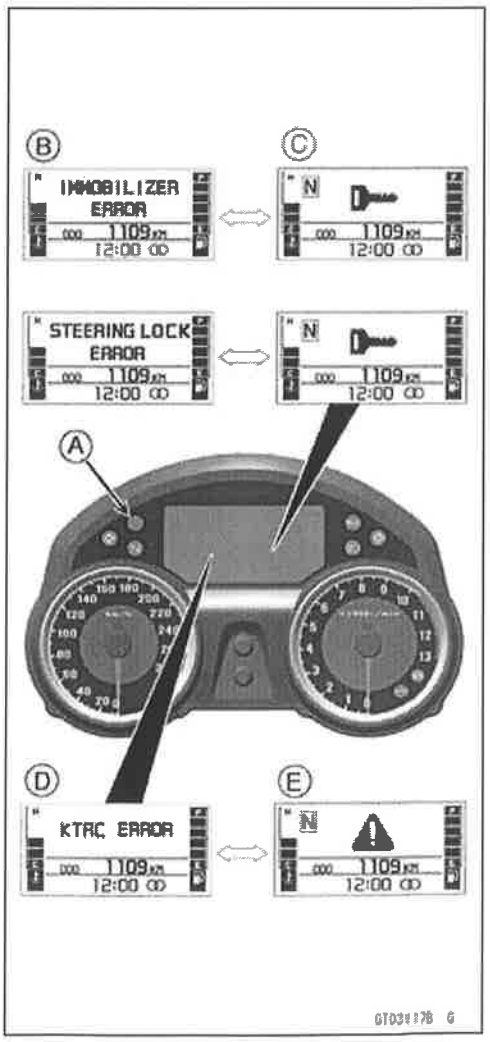
Outline

When a problem occurs with DFI system, the red warning/immobilizer indicator light (LED) [A] goes on and FI warning message [B] and FI warning indicator [C] are displayed alternately on the LCD to alert the rider.



This model equipped with KIPASS system, the red warning/immobilizer indicator light (LED) [A] goes on and KIPASS warning message [B] and KIPASS warning indicator [C] are alternately displayed on the LCD, when a problem occurs in the system.

This model equipped with KTRC system, the red warning/immobilizer indicator light (LED) goes on and KTRC warning message [D] and KTRC warning indicator [E] are alternately displayed on the LCD, when a problem occurs in the system.

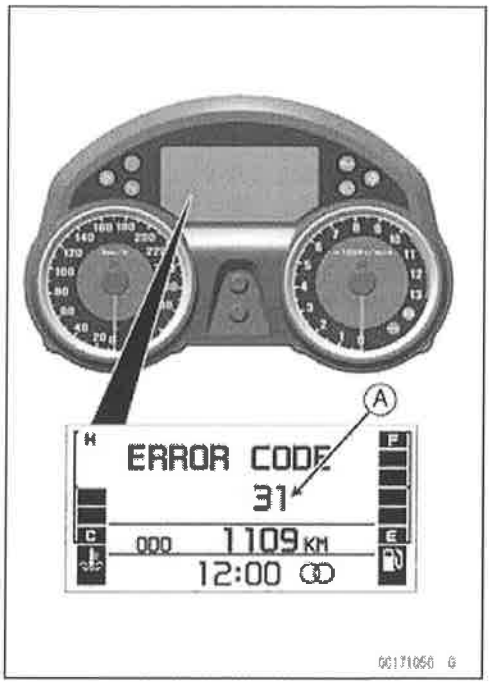


Troubleshooting the DFI System

With the engine stopped and turned in the self-diagnosis mode, the service code (error code) [A] is displayed on the LCD by the number of two digits (see Self-diagnosis Procedures in the Self-Diagnosis System chapter).

If the problem is with the following parts, the ECU cannot recognize these problem. Therefore, the red warning/immobilizer indicator light (LED) does not go on, and warning message, warning indicator and service code are not displayed.

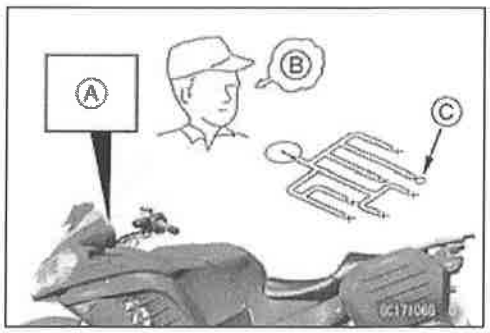
LCD for Meter Unit
Fuel Pump
Fuel Injectors
Stick Coil Secondary Wiring and Ground Wiring
ECU Power Source Wiring and Ground Wiring



When the service code [A] is displayed, for first ask the rider about the conditions [B] of trouble, and then start to determine the cause [C] of problem.

As a pre-diagnosis inspection, check the ECU for ground and power supply, the fuel line for no fuel leaks, and for correct pressure. The pre-diagnosis items are not indicated by the red warning/immobilizer indicator light (LED), warning message and warning indicator.

Do not rely solely on the DFI self-diagnosis function, use common sense.



Even when the DFI system is operating normally, the red warning/immobilizer indicator light (LED) goes on and warning message and warning indicator may be displayed under strong electrical interference. Additional measures are not required. Turn the key knob to "OFF" to stop the indicator light, message and indicator.

If the red warning/immobilizer indicator light (LED) of the motorcycle brought in for repair still goes on, check the service code.

When the repair has been done, the red warning/immobilizer indicator light (LED) goes off and warning message and warning indicator are not displayed on the LCD. But the service codes stored in memory of the ECU are not erased to preserve the problem history. The problem history can be referred using the KDS when solving unstable problems.

When the motorcycle is down, the vehicle-down sensor operates and the ECU shuts off the fuel pump relay, fuel injectors and ignition system. The key knob is left "ON." If the starter button is pushed, the electric starter turns but the engine does not start. When the starter button is pushed, the red warning/immobilizer indicator light (LED) blinks, but the service code is not displayed. To start the engine again, raise the motorcycle, turn the key knob to "OFF," and then push and turn the key knob to "ON."

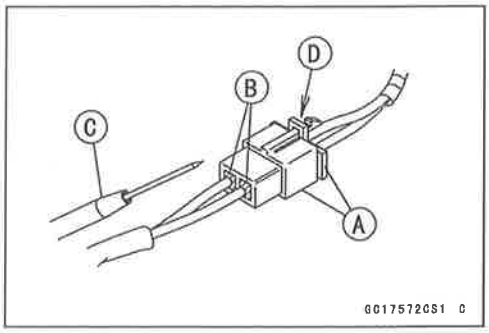
Troubleshooting the DFI System

Much of the DFI system troubleshooting work consists of confirming continuity of the wiring. The DFI parts are assembled and adjusted with precision, and it is impossible to disassemble or repair them.

- When checking the DFI parts, use a digital meter which can be read two decimal place voltage or resistance.

○The DFI part connectors [A] have seals [B], including the ECU. When measuring the input or output voltage with the connector joined, use the needle adapter set [C]. Insert the needle adapter inside the seal until the needle adapter reaches the terminal.

Special Tool - Needle Adapter Set: 57001-1457



NOTICE

Insert the needle adapter straight along the terminal in the connector to prevent short-circuit between terminals.

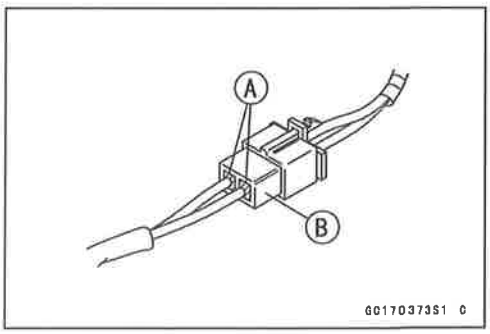
- Make sure that measuring points are correct in the connector, noting the position of the lock [D] and the lead color before measurement. Do not reverse connections of a digital meter.
- Be careful not to short-circuit the leads of the DFI or electrical system parts by contact between adapters.
- Push and turn the key knob to "ON" and measure the voltage with the connector joined.

NOTICE

Incorrect, reverse connection or short circuit by needle adapters could damage the DFI or electrical system parts.

○After measurement, remove the needle adapters and apply liquid gasket to the seals [A] of the connector [B] for waterproofing.

Sealant - Liquid Gasket, TB1211: 56019-120



Troubleshooting the DFI System

- Always check battery condition before replacing the DFI parts. A fully charged battery is a must for conducting accurate tests of the DFI system.
- Trouble may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the problem. If the problem was caused by some other item or items, they too must be repaired or replaced, or the new replacement part will soon fail again.
- Measure coil winding resistance when the DFI part is cold (at room temperature).
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, short, etc. Deteriorated leads and bad connections can cause reappearance of problems and unstable operation of the DFI system.

★If any wiring is deteriorated, replace the wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

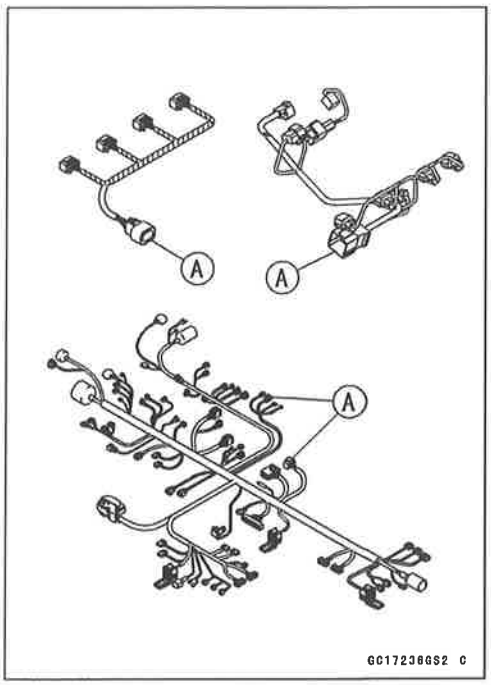
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.

- Check the wiring for continuity.

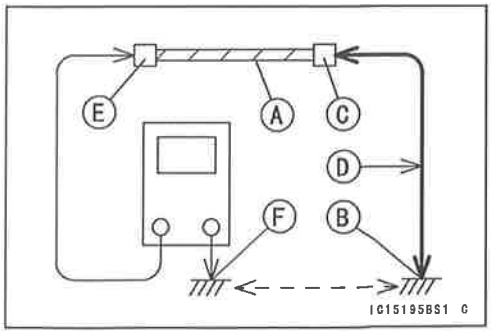
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect a tester between the ends of the leads.

★If the tester does not read about 0 Ω, the lead is defective. Replace the lead or the main harness or the subharness.

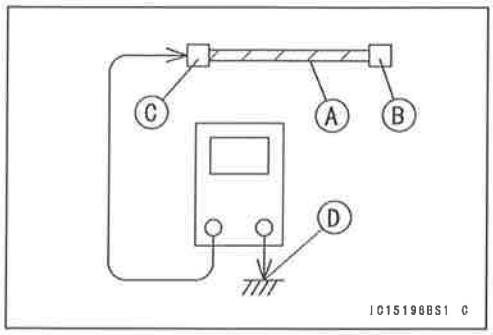


○If both ends of a harness [A] are far apart, ground [B] the one end [C], using a jumper lead [D] and check the continuity between the end [E] and the ground [F]. This enables to check a long harness for continuity. If the harness is open, repair or replace the harness.



Troubleshooting the DFI System

○When checking a harness [A] for short circuit, open one end [B] and check the continuity between the other end [C] and ground [D]. If there is continuity, the harness has a short circuit to ground, and it must be repaired or replaced.



- Narrow down suspicious locations by repeating the continuity tests from the ECU connectors.

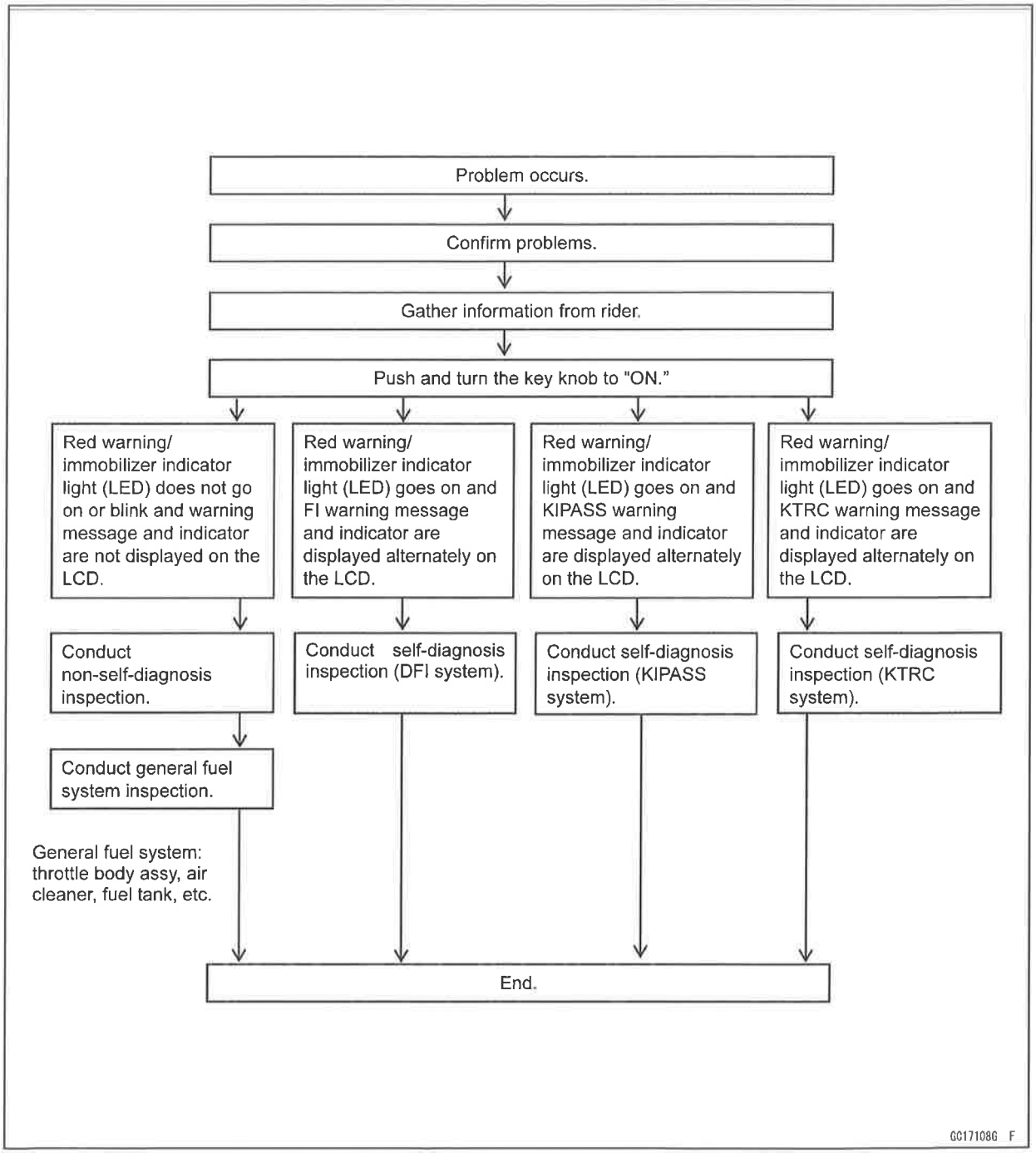
★If no abnormality is found in the wiring or connectors, the DFI parts are the next likely suspects. Check the part, starting with input and output voltages. However, there is no way to check the ECU itself.

★If an abnormality is found, replace the affected DFI part.

★If no abnormality is found in the wiring, connectors, and DFI parts, replace the ECU.

Troubleshooting the DFI System

DFI Diagnosis Flow Chart


Problem occurs.
Confirm problems.
Gather information from rider.
Push and turn the key knob to "ON."
Red warning/ immobilizer indicator light (LED) does not go on or blink and warning message and indicator are not displayed on the LCD.
Red warning/ immobilizer indicator light (LED) goes on and FI warning message and indicator are displayed alternately on the LCD.
Red warning/ immobilizer indicator light (LED) goes on and KIPASS warning message and indicator are displayed alternately on the LCD.
Red warning/ immobilizer indicator light (LED) goes on and KTRC warning message and indicator are displayed alternately on the LCD.
Conduct non-self-diagnosis inspection.
Conduct self-diagnosis inspection (DFI system).
Conduct self-diagnosis inspection (KIPASS system).
Conduct self-diagnosis inspection (KTRC system).
Conduct general fuel system inspection.
General fuel system: throttle body assy, air cleaner, fuel tank, etc.
End.
GC17108G F

Inquiries to Rider

- Each rider reacts to problems in different ways, so it is important to confirm what kind of symptoms the rider has encountered.
- Try to find out exactly what problem occurred under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem.
- The diagnosis sheet will help prevent you from overlooking any areas, and will help you decide if it is a DFI system problem, or a general engine problem.

Troubleshooting the DFI System

Sample Diagnosis Sheet

Rider name:	**Registration No. (license plate No.):**	**Year of initial registration:**
Model:	**Engine No.:**	**Frame No.:**
Date problem occurred:		**Mileage:**
Environment when problem occurred.		
Weather	☐ fine, ☐ cloudy, ☐ rain, ☐ snow, ☐ always, ☐ other:	
Temperature	☐ hot, ☐ warm, ☐ cold, ☐ very cold, ☐ always, ☐ other:	
Problem frequency	☐ chronic, ☐ often, ☐ once	
Road	☐ street, ☐ highway, ☐ mountain road (☐ uphill, ☐ downhill), ☐ bumpy, ☐ pebble	
Altitude	☐ normal, ☐ high (about 1000 m or more)	
Motorcycle conditions when problem occurred.		
Red warning/immobilizer indicator light (LED)	☐ Goes on about 3 seconds after turning the key knob to "ON," and FI warning message and indicator are displayed alternately on the LCD (DFI system problem).	
	☐ Goes on about 3 seconds after turning the key knob to "ON," and KTRC warning message and indicator are displayed alternately on the LCD (KTRC system problem).	
	☐ Goes on about 3 seconds after turning the key knob to "ON," and KIPASS warning message and indicator are displayed alternately on the LCD (KIPASS system problem).	
	☐ Does not go on about 3 seconds after turning the key knob to "ON."	
Starting difficulty	☐ starter motor is not rotating.	
	☐ starter motor is rotating but engine does not turn over.	
	☐ starter motor and engine do not turn over.	
	☐ no fuel flow (☐ no fuel in tank, ☐ no fuel pump sound).	
	☐ no spark.	
	☐ other:	
Engine stalls	☐ right after starting.	
	☐ when opening throttle grip.	
	☐ when closing throttle grip.	
	☐ when moving off.	
	☐ when stopping motorcycle.	
	☐ when cruising.	
	☐ other:	

Troubleshooting the DFI System

Poor running at low speed	☐ very low idle speed, ☐ very high idle speed, ☐ rough idle speed.
	☐ battery voltage is low (charge the battery).
	☐ spark plug loose (tighten it).
	☐ spark plug dirty, broken, or gap maladjusted (remedy it).
	☐ backfiring.
	☐ afterfiring.
	☐ hesitation when acceleration.
	☐ engine oil viscosity too high.
	☐ brake dragging.
	☐ engine overheating.
	☐ clutch slipping.
	☐ other:
Poor running or no power at high speed	☐ spark plug loose (tighten it).
	☐ spark plug dirty, broken, or gap maladjusted (remedy it).
	☐ spark plug incorrect (replace it).
	☐ knocking (fuel poor quality or incorrect, → use high-octane gasoline).
	☐ brake dragging.
	☐ clutch slipping.
	☐ engine overheating.
	☐ engine oil level too high.
	☐ engine oil viscosity too high.
	☐ other:

DFI System Troubleshooting Guide

NOTE

○*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties in DFI system.*

○*The ECU may be involved in the DFI electrical and ignition system troubles. If these parts and circuits are checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.*

Engine Won't Turn Over

Symptoms or possible Causes	Actions (chapter)
Gear position, starter lockout or side stand switch trouble	Inspect each switch (see chapter 16).
KIPASS system trouble	Inspect (see chapter 17).
Vehicle-down sensor operated	Turn ignition switch off (see chapter 17).
Vehicle-down sensor trouble	Inspect (see chapter 17).
Crankshaft sensor trouble	Inspect (see chapter 16).
Stick coil shorted or not in good contact	Inspect or Reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with correct plug (see chapter 2).
ECU ground and power supply trouble	Inspect (see chapter 3).
ECU trouble	Inspect (see chapter 3).
No or little fuel in tank	Add fuel (see Owner's Manual).
Fuel injector trouble	Inspect and replace (see chapter 3).
Fuel pump not operating	Inspect (see chapter 3).
Fuel pump relay trouble	Inspect and replace (see chapter 16).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).

Poor Running at Low Speed

Symptoms or Possible Causes	Actions (chapter)
Spark weak:	
Stick coil shorted or not in good contact	Inspect or reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Little fuel in tank	Add fuel (see Owner's Manual).
Air cleaner clogged, poorly sealed, or missing	Replace element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Throttle body assy holder loose	Reinstall (see chapter 3).
Throttle body assy dust seal damage	Replace (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 3).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 17).
Atmospheric pressure sensor trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Unstable (rough) idling:	
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Engine vacuum not synchronizing	Inspect and adjust (see chapter 2).
Intake air pressure sensor trouble	Inspect (see chapter 17).
Atmospheric pressure sensor trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Engine stalls easily:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
Exhaust camshaft position sensor trouble	Inspect (see chapter 16).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor trouble	Inspect (see chapter 17).
Atmospheric pressure sensor trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Poor acceleration:	
Fuel pressure too low	Inspect (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor trouble	Inspect (see chapter 17).
Atmospheric pressure sensor trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
Stumble:	
Fuel pressure too low	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor trouble	Inspect (see chapter 17).
Atmospheric pressure sensor trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Surge:	
Unstable fuel pressure –Fuel pressure regulator trouble –Kinked fuel line	Inspect and replace fuel pump (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 17).
Backfiring when deceleration:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Fuel pressure too low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor trouble	Inspect (see chapter 17).
Atmospheric pressure sensor trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).
After fire:	
Spark plug burned or gap maladjusted	Replace (see chapter 2).
Fuel injector trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 17).
Atmospheric pressure sensor trouble	Inspect (see chapter 17).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Other:	
Intermittent any DFI fault and its recovery	Check that DFI connectors are clean and tight, and examine leads for signs of burning or fraying (see chapter 3).

Poor Running or No Power at High Speed:

Symptoms or Possible Causes	Actions (chapter)
Firing incorrect:	
Stick coil shorted or not in good contact	Inspect or reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Air cleaner clogged, poorly sealed, or missing	Replace element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Throttle body assy holder loose	Reinstall (see chapter 3).
Throttle body assy dust seal damage	Replace (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 3).
Fuel injector clogged	Inspect and repair (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump operates intermittently and often DFI fuse blows.	Fuel pump bearings may wear. Replace fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 17).
Cracked or obstructed intake air pressure sensor vacuum hose	Inspect and repair or replace (see chapter 3).
Atmospheric pressure sensor trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Knocking:	
Fuel poor quality or incorrect	Fuel change (Use the gasoline recommended in the Owner's Manual).
Spark plug incorrect	Replace it with correct plug (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
ECU trouble	Inspect (see chapter 3).
Engine vacuum not synchronizing	Inspect and adjust (see chapter 2).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Intake air pressure sensor trouble	Inspect (see chapter 17).
Atmospheric pressure sensor trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Miscellaneous:	
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Speed sensor trouble	Inspect (see chapter 17).
Throttle valves will not fully open	Inspect throttle cables and lever linkage (see chapter 3).
Engine overheating - Water temperature sensor, crankshaft sensor or speed sensor trouble	(see Overheating of Troubleshooting Guide in chapter 18)
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).
Exhaust Smokes Excessively:	
(Black smokes)	
Air cleaner element clogged	Replace element (see chapter 2).
Fuel pressure too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
(Brown smokes)	
Air duct loose	Reinstall (see chapter 3).
Fuel pressure too low	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).

Red Warning/Immobilizer Indicator Light (LED)

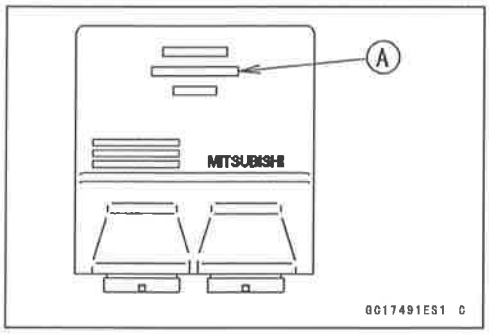
Red Warning/Immobilizer Indicator Light (LED) Inspection

OIn this model, the red warning/immobilizer indicator light (LED) [A] goes on or blinks by the data sent from the ECU or KIPASS ECU.

- Refer to the Meter Operation Inspection in the Electrical System chapter.

ECU

ECU Identification



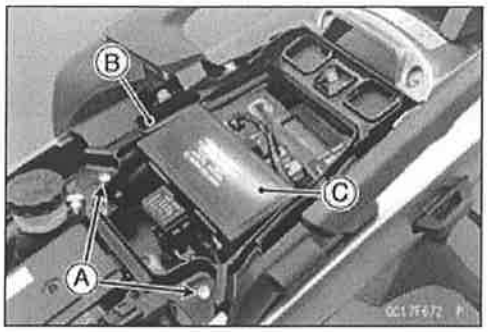
○Most countries have their own regulations, so each ECU has different characteristic. So, do not confuse ECU with each other and use only the ECU for your model. Otherwise, the motorcycle cannot clear the regulation.

ECU Identification

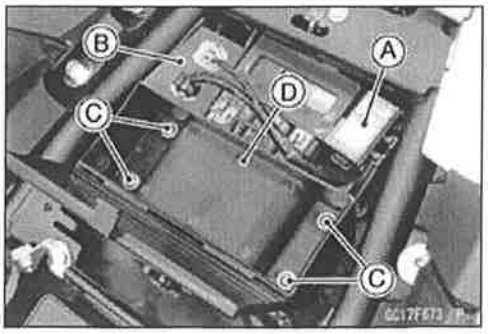
Part Number [A]	Specification
21175-0944	AU
	CN
	MY
	PH
	SEA-B1
	SEA-B2
	SEA-B3
	WVTA (FULL)
	GB WVTA (FULL)
	Euro 3
21175-0957	WVTA (78.2)
21175-0958	US
	CA
21175-0959	CAL
21175-0983	TH

ECU Removal

NOTICE
Never drop the ECU, especially on a hard surface. Such a shock to the ECU can damage it.



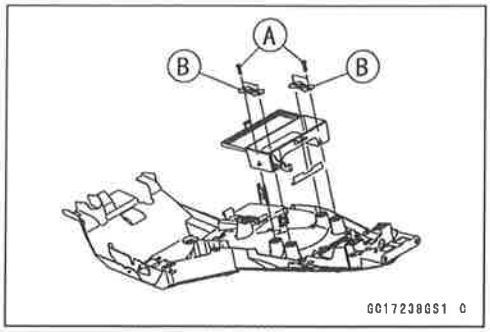
- Remove:
  Seat (see Seat Removal in the Frame chapter)
  Bolts [A]
  Seat Under Plate [B]
- Open the lid [C] of the tool kit case.
- Remove the tool kit.



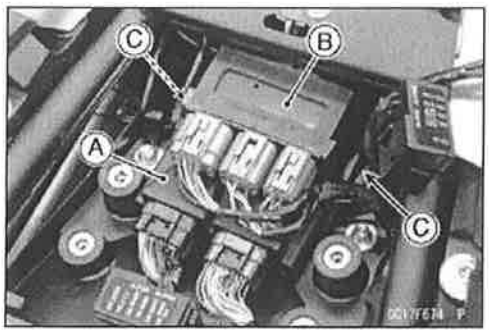
- Free the fuse box 2 [A] from the tool kit case.
- Take off the connector holder [B] with the KDS connectors.
- Remove:
  Bolts [C]
  Tool Kit Case [D]

ECU

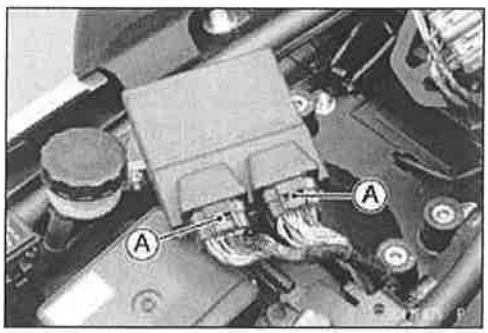
- For ECU guard equipped models, using a small chisel or other suitable tool, cut off the screws [A] and remove the plates [B].



- Lift up the ECU [A] with the relay box [B] to clear the rubber protector from the projections [C] of the rear fender.
- Remove the ECU from the rubber protector.

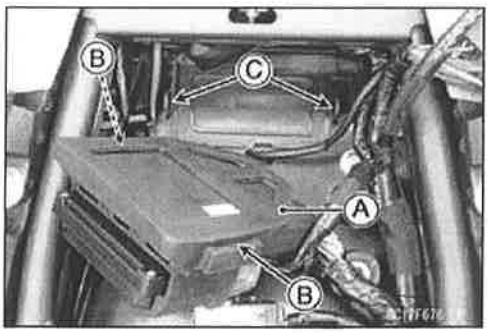


- Disconnect:
  ECU Connectors [A]

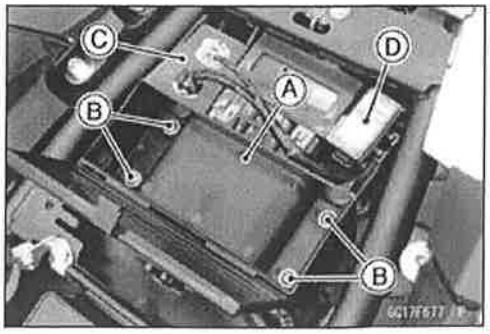


ECU Installation

- Connect the ECU connectors.
- Install the ECU to the rubber protector [A].
- Insert the slits [B] of the rubber protector to the projections [C] of the rear fender.

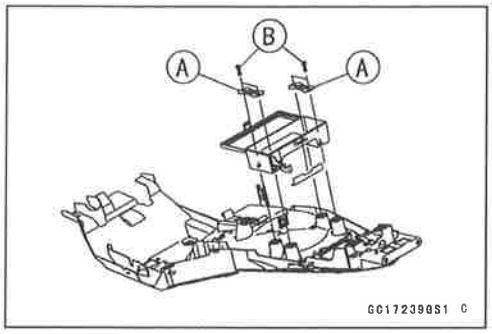


- Install the tool kit case [A] and tighten the bolts [B].
  Torque - Tool Kit Case Bolts: 4.0 N·m (4.1 kgf·m, 35 in·lb)
- Install the connector holder [C] with the KDS connectors to the original position.
- Install the fuse box 2 [D] to the tool kit case.



ECU

- For WVTA (78.2), GB WVTA (FULL) and Euro 3 models, install the plates [A] and tighten new screws [B] of the tool kit case use Kawasaki genuine screws of witch treads are coated with non-permanent locking agent.



ECU Power Supply Inspection

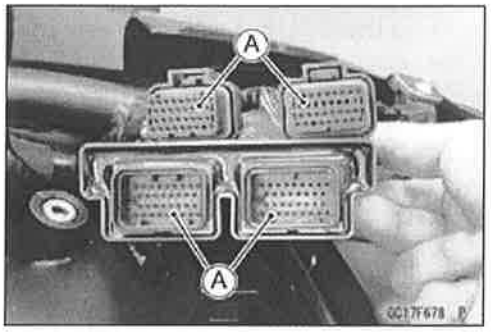
- Remove the tool kit case (see ECU Removal).
- Visually inspect the ECU connectors.

★If the connector is clogged with mud or dust, blow it off with compressed air.

- Remove the ECU (see ECU Removal).
- Visually inspect the terminals [A] of the ECU and main harness connectors.

★If the terminals of the main harness connectors are damaged, replace the main harness.

★If the terminals of the ECU connectors are damaged, replace the ECU.

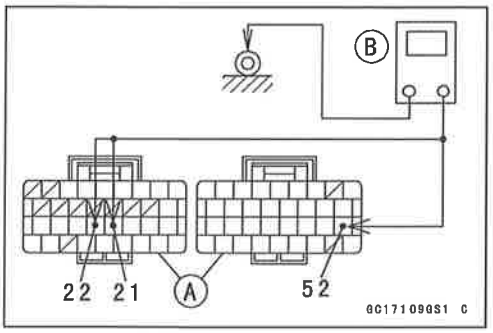


- Turn the key knob to "OFF."
- Disconnect the ECU connectors [A].
- Set a tester [B] and check the following wiring for continuity.

ECU Grounding Inspection
Connections:

(I) BK/Y leads (ECU Terminal 21, 22 or 52)	⟷	**Frame Ground Terminal**
(II) Engine Ground	⟷	**Frame Ground Terminal**

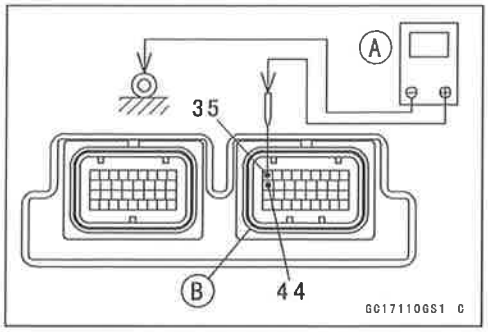
Criteria:
Both: 0 Ω



★If no continuity, check the connectors, the engine ground lead, or main harness, and repair or replace them if necessary.

ECU

★If the wiring is good, check the power source voltage of the ECU.



NOTE

○*Be sure the battery is fully charged.*

- Connect the ECU connectors.
- Connect a digital meter [A] to the connector [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

ECU Power Supply Inspection

Connections:

(I) Digital Meter (+) → Terminal 35 (BR/BK)

Digital Meter (–) → Frame Ground Terminal

(II) Digital Meter (+) → Terminal 44 (W/BK)

Digital Meter (–) → Frame Ground Terminal

Criteria:

Key knob is "OFF":

Terminal 35 (BR): 0 V

Terminal 44 (W/BK): Battery Voltage

Key knob is "ON":

Both: Battery Voltage

★If the reading is out of the specification, check the following.

Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)

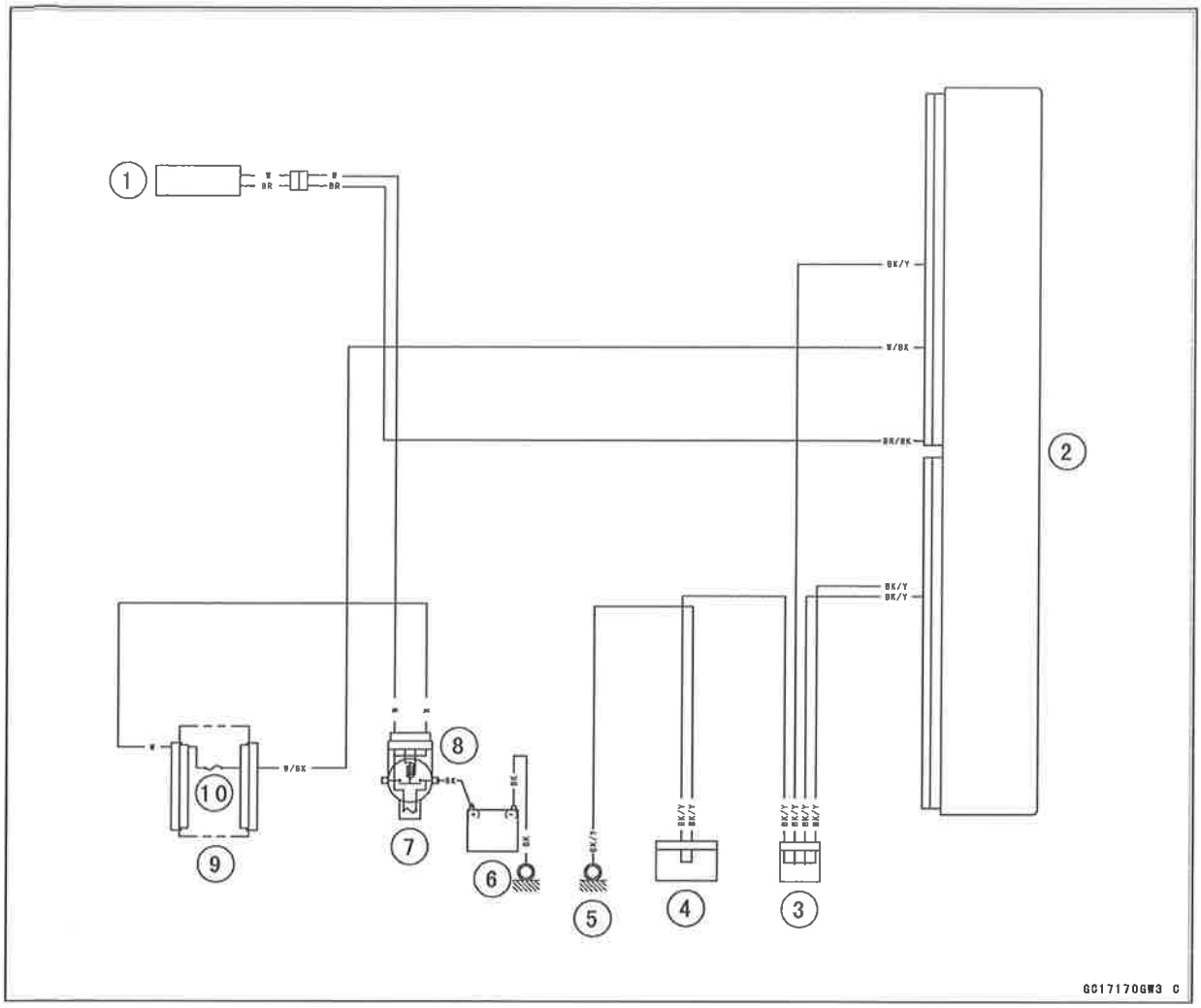
ECU Fuse 15 A (see Fuse Inspection Electrical System chapter)

Power Source Wiring (see ECU Power Source Circuit)

★If the fuses and wiring are good, replace the ECU (see ECU Removal/Installation).

ECU

ECU Power Source Circuit



1. Steering Lock Unit
2. ECU
3. Joint Connector 3
4. Joint Connector 9
5. Frame Ground
6. Battery 12 V 14 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 2
10. ECU Fuse 15 A

CAN Communication Line

CAN Communication Line Resistance Inspection

○The resistors for CAN communication line are built in the ECU, KIPASS ECU and meter unit.

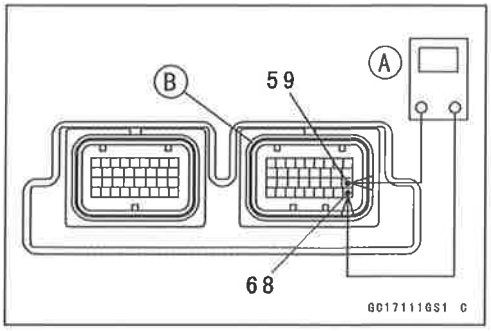
- Refer to the Meter Unit Inspection in the Electrical System chapter for the resistor in the meter unit.
- Turn the key knob to "OFF."
- Remove:
  ECU (see ECU Removal)
  KIPASS ECU (see KIPASS ECU Replacement in the Electrical System chapter)

- Connect a digital meter [A] to the ECU connector [B].
- Measure the resistance of the CAN communication line resistor.

CAN Communication Line Resistance (at ECU Connector)

Connections: Terminal 59 ←→Terminal 68

Standard: 123 ~ 125 Ω

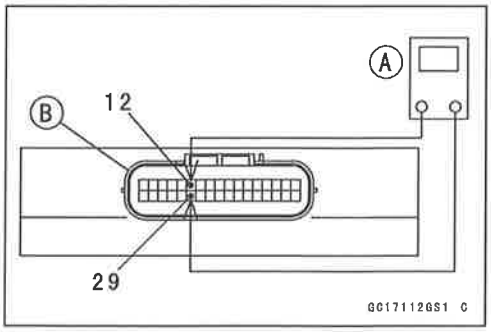


- Connect a digital meter [A] to the KIPASS ECU connector [B].
- Measure the resistance of the CAN communication line.

CAN Communication Line Resistance (at KIPASS ECU Connector)

Connections: Terminal 12 ←→ Terminal 29

Standard: 114 ~ 126 Ω



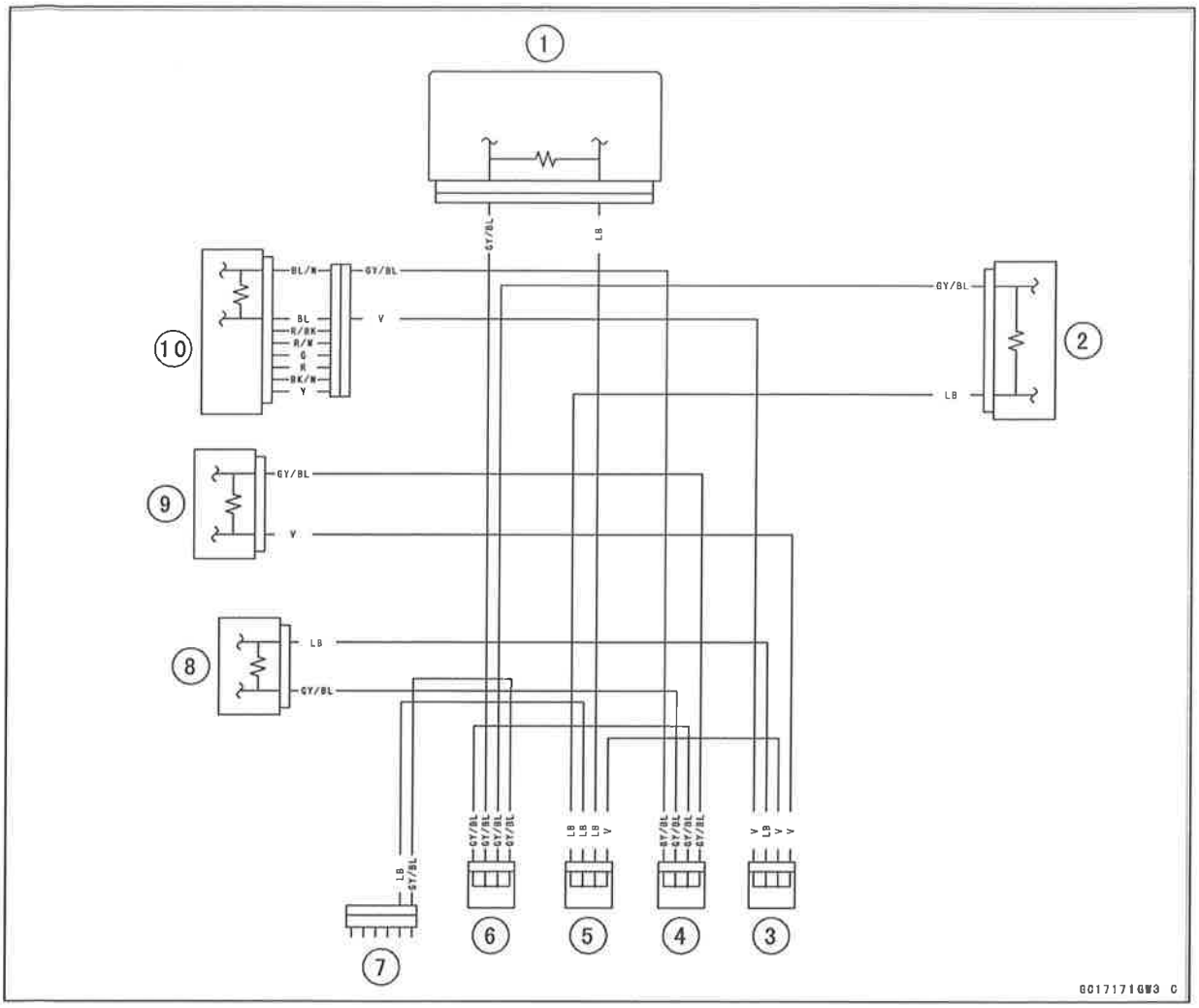
★If the reading is out of the standard, replace the ECU and/or KIPASS ECU.

★If the reading is within the standard, resistor of the ECU and/or KIPASS ECU for CAN communication line is normal. Check the wiring for continuity of the CAN communication line (see CAN Communication Line Circuit).

★If the wiring is open, repair or replace the main harness.

CAN Communication Line

CAN Communication Line Circuit



1. KIPASS ECU
2. ECU
3. Joint Connector 4
4. Joint Connector 5
5. Joint Connector 6
6. Joint Connector 7
7. Kawasaki Diagnostic System Connector
8. Meter Unit
9. K-ACT ABS Hydraulic Unit
10. Steering Lock Unit

DFI Power Source

ECU Fuse Removal

- Refer to the Fuse Box Fuse Removal in the Electrical System chapter.

ECU Fuse Installation

★If a fuse fails during operation, inspect the DFI system to determine the cause, and then replace it with a new fuse of proper amperage.

- Refer to the Fuse Installation in the Electrical System chapter.

ECU Fuse Inspection

- Refer to the Fuse Inspection in the Electrical System chapter.

ECU Main Relay Removal/Installation

○The ECU main relay function is included in the ECU and can not be removed.

ECU Main Relay Inspection

○The ECU main relay function is included in the ECU and can not be inspected.

Fuel Line

Fuel Pressure Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Fuel Hose (see Fuel Tank Removal)

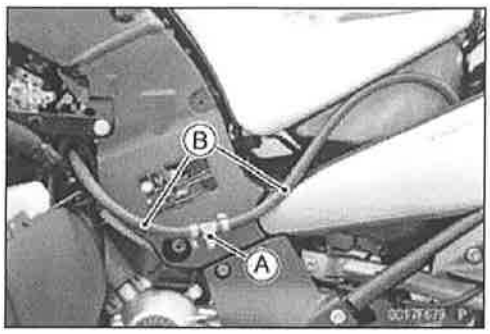
○Be sure to place a piece of cloth around the delivery pipe of the throttle body assy.

⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

- Install the fuel pressure gauge adapter [A] and fuel hoses (Special Tool) [B] between the fuel tank and throttle body assy.

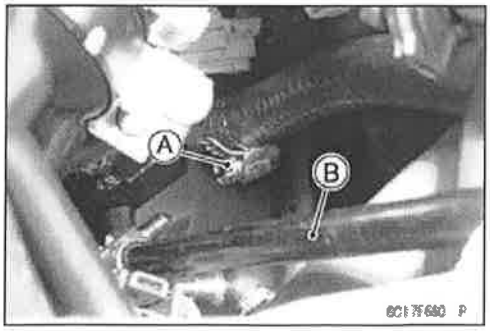
Special Tools - Fuel Pressure Gauge Adapter: 57001-1593
Fuel Hose: 57001-1607



- Secure the fuel hoses with the clamps.

○When tightening the clamp screw [A] of the throttle body assy side, use the pilot screw adjuster [B].

Special Tool - Pilot Screw Adjuster, C: 57001-1292

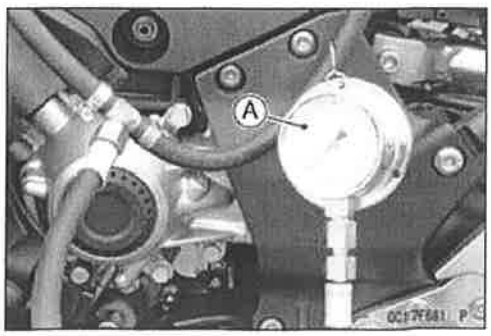


- Connect the pressure gauge [A] to the fuel pressure gauge adapter.

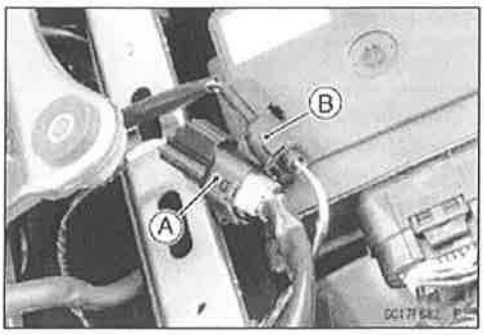
Special Tool - Oil Pressure Gauge, 5 kgf/cm²: 57001-125

⚠ WARNING

Fuel is extremely flammable and can be explosive under certain conditions resulting in serious injury or death. Do not try to start the engine with the fuel hoses disconnected.



Fuel Line



- Connect:
  Fuel Pump Lead Connector [A]
  Fuel Level Sensor Lead Connector [B]
- Turn the engine stop switch to run position.
- Push and turn the key knob to "ON."

○The fuel pump should operate for 3 seconds, and then should stop.

NOTE

○*After turning on the engine stop switch and key knob, inspect the fuel leakage from the connected portion of the special tools.*

NOTICE

Do not drive the fuel pump 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

- Start the engine, and let it idle.
- Measure the fuel pressure with the engine idling.

Fuel Pressure (with Engine Idling)
Standard: 294 kPa (3.0 kgf/cm², 43 psi)

NOTE

○*The gauge needle will fluctuate. Read the pressure at the average of the maximum and minimum indications.*

- Turn the key knob to "OFF."

★If the fuel pressure is much higher than specified, replace the fuel pump because the fuel pressure regulator in the fuel pump have been clogged or stuck.

★If the fuel pressure is much lower than specified, check the following.
  Fuel Line Leakage (see Fuel Injector Fuel Line Inspection)
  Amount of Fuel Flow (see Fuel Flow Rate Inspection)

- After above checks, measure the fuel pressure again.
- Remove the oil pressure gauge, hoses and adapter.
- Install:
  Fuel Hose (see Fuel Tank Installation)
  Fuel Tank (see Fuel Tank Installation)
- Start the engine and check for fuel leakage.

Fuel Line

Fuel Flow Rate Inspection

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the key knob off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

NOTE

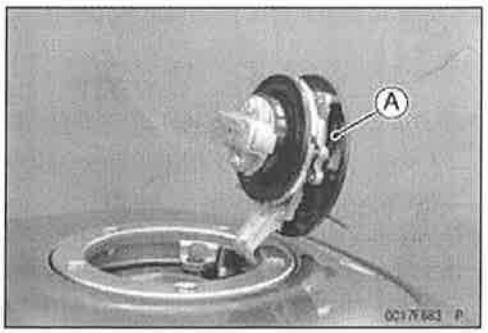
○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Wait until the engine cools down.
- Prepare the fuel hose (Special Tool) and a measuring cylinder.

Special Tool - Fuel Hose: 57001-1607

- Remove the fuel tank bolts (see Fuel Tank Removal).
- Open the fuel tank cap [A] to lower the pressure in the tank.
- Remove the fuel hose from the fuel pump (see Fuel Tank Removal).

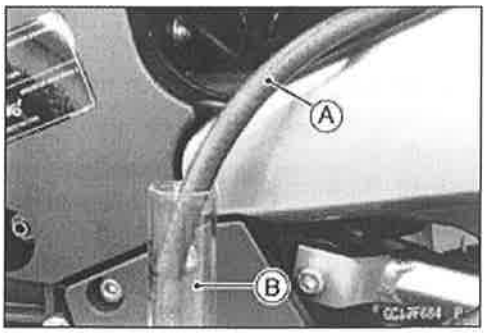
○Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump.



⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

- Connect the prepared fuel hose [A] to the fuel outlet pipe.
- Secure the fuel hose with a clamp.
- Insert the fuel hose into the measuring cylinder [B].



⚠ WARNING

Wipe off spilled out fuel immediately.
Be sure to hold the measuring cylinder vertical.

- Close the fuel tank cap.
- Turn the engine stop switch to run position.
- Push and turn the key knob to "ON."

○The fuel pump should operate for 3 seconds, and then should stop.

Fuel Line

NOTICE
Do not drive the fuel pump 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

- Measure the discharge for 3 seconds.

○Repeat this operation several times.

Amount of Fuel Flow
Standard: 67 mL (2.3 US oz.) or more for 3 seconds

- Turn the key knob to "OFF."

★If the fuel flow is much less than the specified, replace the fuel pump (see Fuel Pump Removal/Installation).

- Install the fuel tank (see Fuel Tank Installation).
- Start the engine and check for fuel leakage.

Fuel Pump

Fuel Pump Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the key knob off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

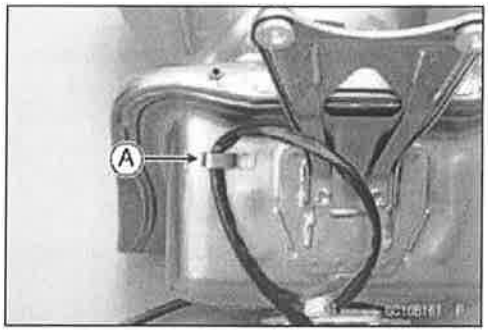
NOTICE

Never drop the fuel pump, especially on a hard surface. Such a shock to the pump can damage it.

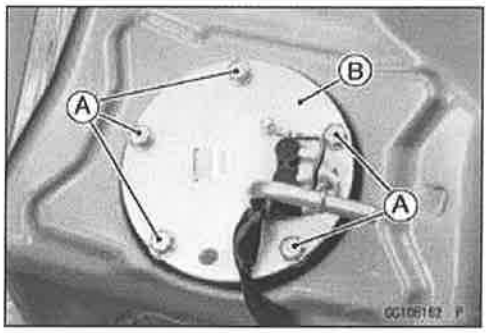
- Draw the fuel out from the fuel tank with a commercially available electric pump.
- Remove the fuel tank (see Fuel Tank Removal).

○Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump. Plug the fuel pipe of the fuel tank.

- Open the clamp [A].



- Turn the fuel tank upside down.
- Remove:
  Fuel Pump Bolts [A]
  Fuel Pump [B]



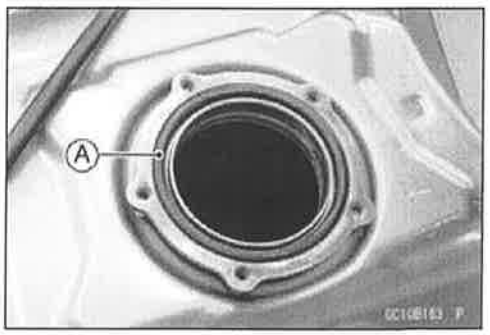
NOTICE

Do not pull the leads of the fuel pump and fuel reserve switch. If they are pulled, the lead terminals may be damaged.

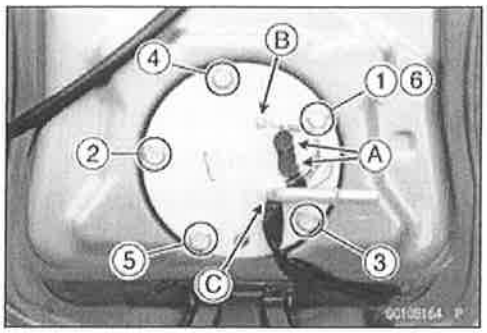
- Discard the fuel pump O-ring.

Fuel Pump Installation

- Remove dirt or dust from the fuel pump by lightly applying compressed air.
- Replace the O-ring [A] with a new one.



Fuel Pump



- Check that the fuel pump terminals [A], fuel reserve switch terminal [B] and band [C] are in place.
- Apply a non-permanent locking agent to the fuel pump bolts.
- Tighten the fuel pump bolts to a snug fit following the specified tightening sequence.
- Following the specified tightening sequence, tighten the fuel pump bolts to the specified torque.

Torque - Fuel Pump Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Tighten the fuel pump bolts again to check the tightness in the order shown.

Fuel Pump Operation Inspection

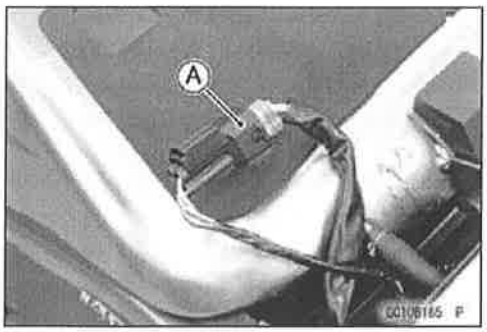
NOTE

○*Be sure the battery is fully charged.*

- Turn the engine stop switch to run position.
- Push and turn the key knob to "ON" and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
- Turn the key knob to "OFF."

★If the pump does not operate as described above, check the operating voltage (see Fuel Pump Operating Voltage Inspection).

Fuel Pump Operating Voltage Inspection



NOTE

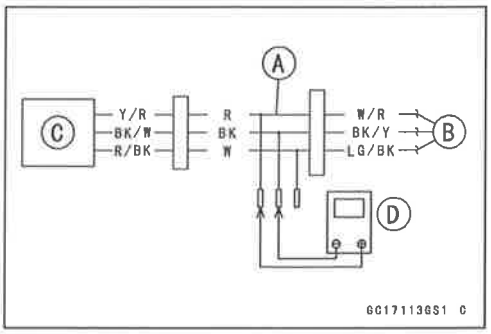
○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the seat (see Seat Removal in the Frame chapter).
- Pull up the fuel pump lead connector [A].

Fuel Pump

- Connect the measuring adapter [A] between the fuel pump lead connectors as shown.
  Main Harness [B]
  Fuel Pump [C]

  Special Tool - Measuring Adapter: 57001-1700
- Connect a digital meter [D] to the measuring adapter leads.



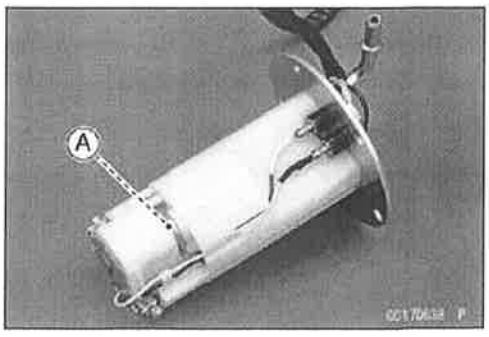
  Fuel Pump Operating Voltage
  Connections to Adapter:
  Digital Meter (+) → R (pump Y/R) lead
  Digital Meter (–) → BK (pump BK/W) lead
- Measure the operating voltage with engine stopped and with the connector joined.
- Turn the engine stop switch to run position.
- Push and turn the key knob to "ON."

  Operating Voltage
  Standard: Battery Voltage for 3 seconds, and then 0 V
- Turn the key knob to "OFF."

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If there is still no battery voltage, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the wiring for continuity (see Fuel Pump Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the reading is in specification, but the pump does not operate, replace the fuel pump (see Fuel Pump Removal/Installation).

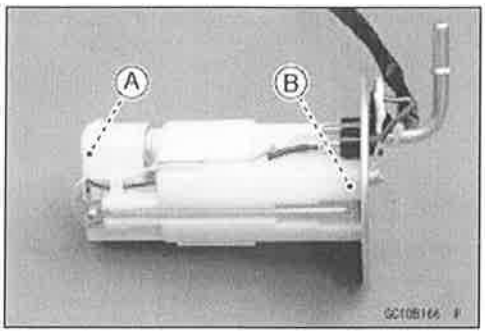
Pressure Regulator Removal

○The pressure regulator [A] is built into the fuel pump and can not be removed.



Fuel Pump

Fuel Pump Screen, Fuel Filter Cleaning



○The fuel pump screen [A] and fuel filter [B] is built into the pump and can not be cleaned or checked.

★If the fuel pump screen or fuel filter is suspected of clogging or being damaged, replace it with the fuel pump as a set.

Fuel Filter Replacement

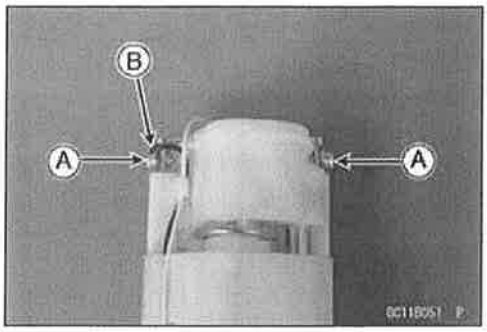
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (-) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

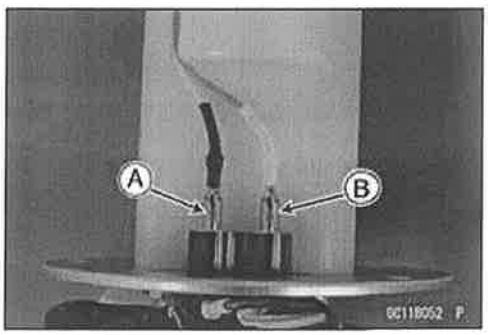
NOTICE

Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.

● Remove:
Fuel Pump (see Fuel Pump Removal)
Fuel Pump Assembly Screws [A]
Lead Terminal [B]

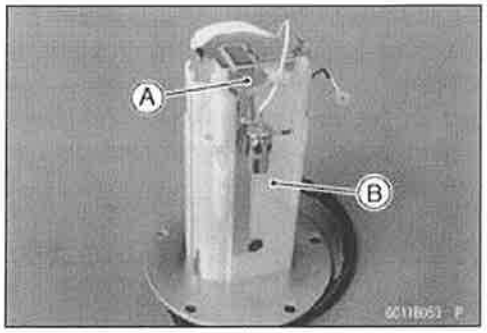


● Disconnect:
Lead Connector (White) [A]
Lead Connector (Light Blue) [B]

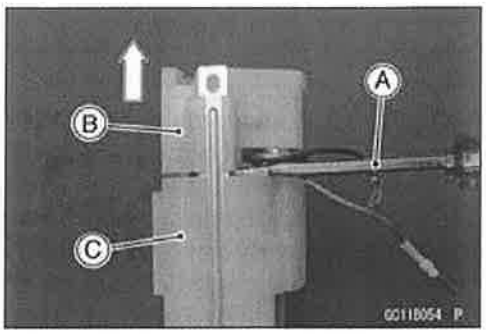


Fuel Pump

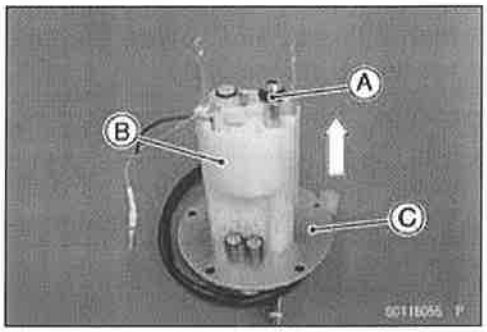
- Remove the thermistor bracket [A] from the fuel pump body [B].



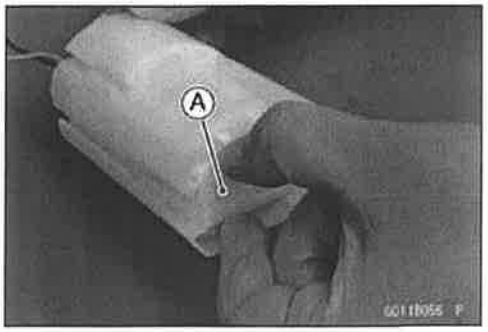
- Using the flat tip screwdriver [A], remove the fuel pump case [B] from the fuel pump body [C].



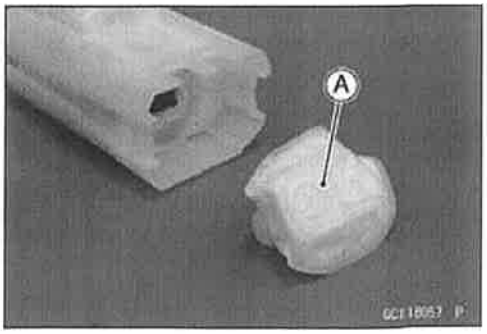
- Remove the O-ring [A].
- Remove the fuel pump body [B] from the installation plate [C].



- Remove the fuel filter [A].

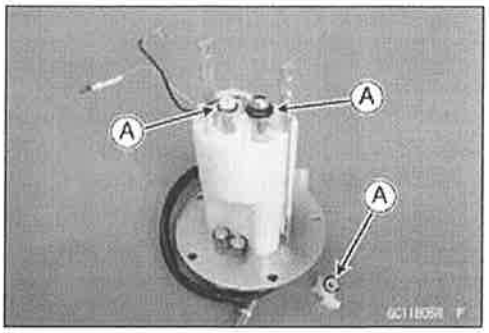


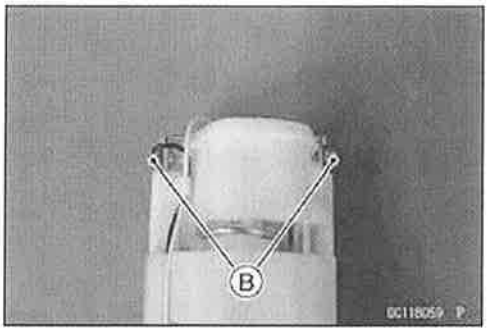
- Replace the fuel filter [A] with a new one, and install it.



Fuel Pump

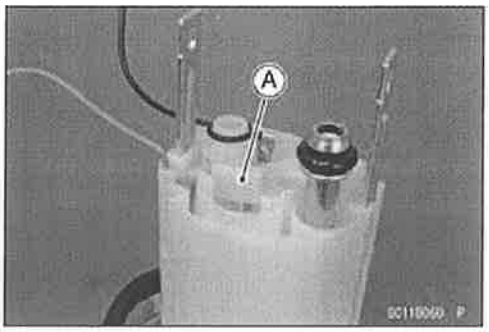
- Replace the following parts with new ones.
  O-rings [A]
  Fuel Pump Assembly Screws [B]





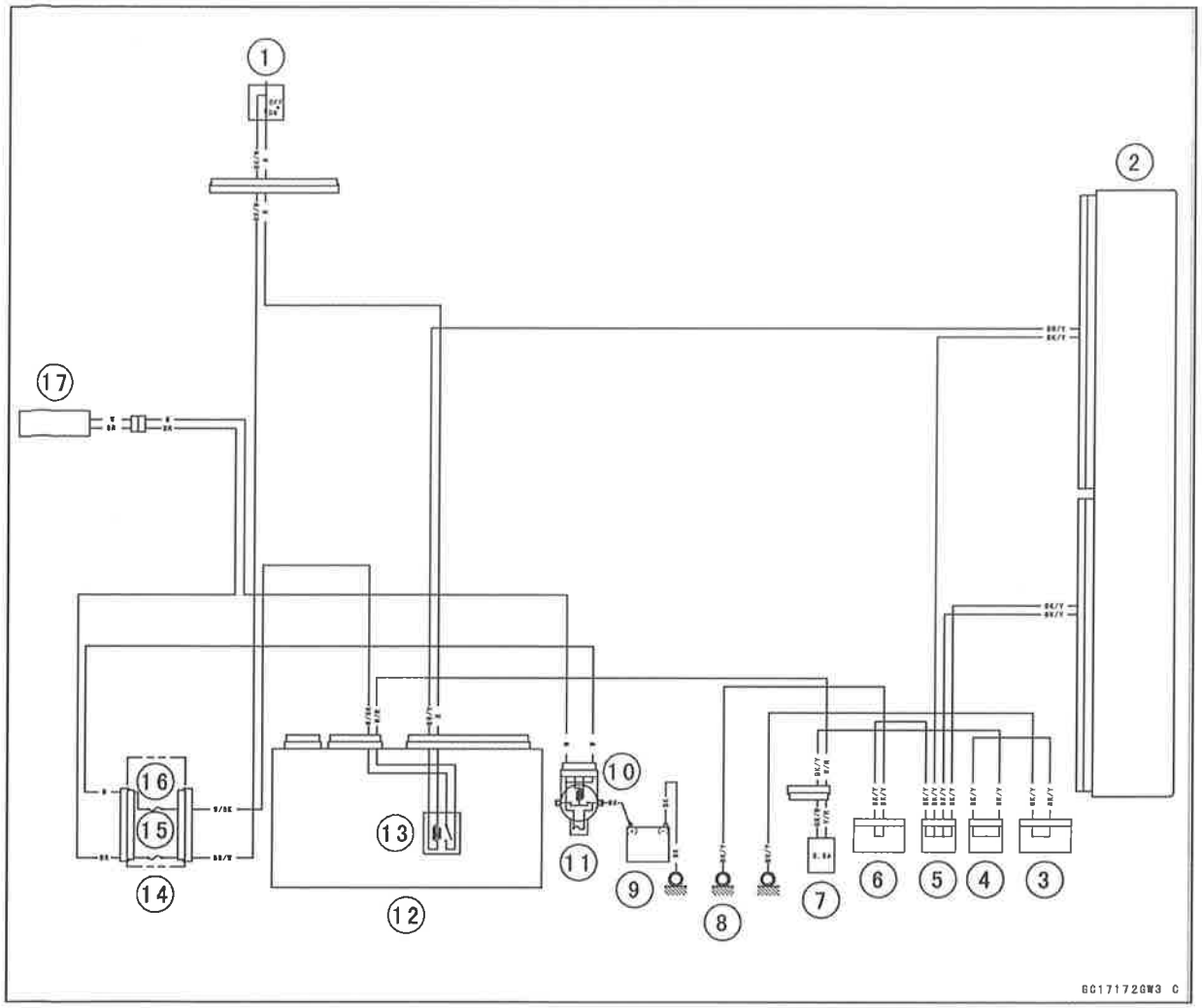
- Install the removed parts in the reverse procedure.
- Install the cap [A] so that the light blue lead terminal covered as shown.
- Tighten:

Torque - Fuel Pump Assembly Screws: 0.98 N·m (0.10 kgf·m, 8.7 in·lb)



Fuel Pump

Fuel Pump Circuit



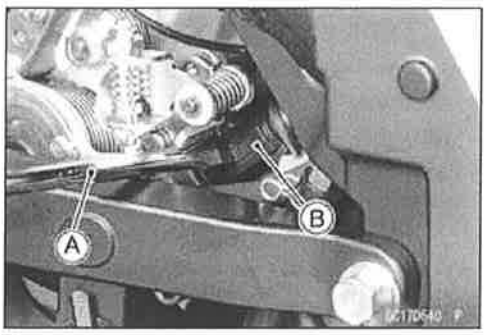
1. Engine Stop Switch
2. ECU
3. Joint Connector 1
4. Joint Connector 2
5. Joint Connector 3
6. Joint Connector 9
7. Fuel Pump
8. Frame Ground
9. Battery 12 V 14 Ah
10. Starter Relay
11. Main Fuse 30 A
12. Relay Box
13. Fuel Pump Relay
14. Fuse Box 2
15. Ignition Fuse 15 A
16. ECU Fuse 15 A
17. Steering Lock Unit

Fuel Injectors

Fuel Injector Removal/Installation

- Refer to the Throttle Body Assy Disassembly/Assembly.

Fuel Injector Audible Inspection



NOTE

○*Be sure the battery is fully charged.*

- Remove the left and right rear middle fairings (see Rear Middle Fairing Removal in the Frame chapter).
- Start the engine, and let it idle.
- Apply the tip of a screwdriver [A] to the fuel injector [B].
- Put the grip end onto your ear, and listen whether the fuel injector is clicking or not.

○A sound scope can also be used.

○The click interval becomes shorter as the engine speed rises.

- Do the same for the other fuel injectors.

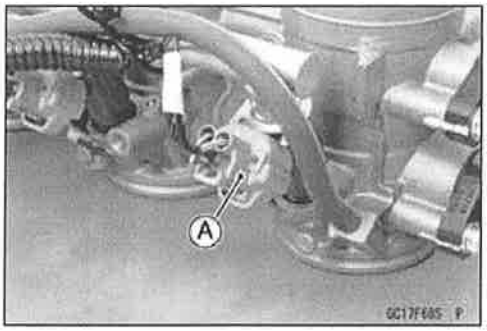
★If all the fuel injectors click at a regular intervals, the fuel injectors are normal.

- Turn the key knob to "OFF."

★If any fuel injector does not click, check the fuel injector resistance (see Fuel Injector Resistance Inspection).

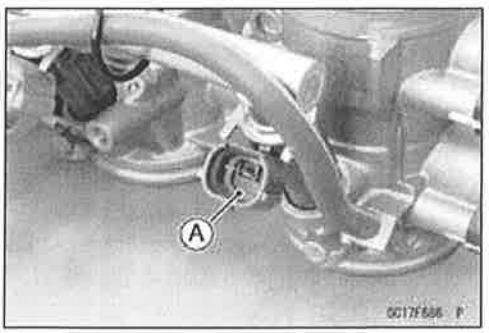
Fuel Injector Resistance Inspection

- Remove the throttle body assy (see Throttle Body Assy Removal).
- Disconnect the fuel injector connector [A].



- Connect a digital meter to the terminals in each fuel injector [A].
- Measure the fuel injector resistance.

Fuel Injector Resistance
Standard: About 11.7 ~ 12.3 Ω @20°C (68°F)

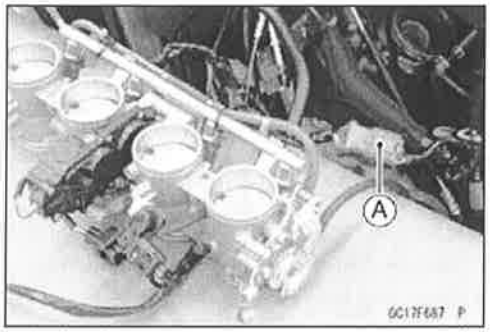


★If the reading is out of the standard, replace the fuel injector.

★If the reading within the standard, check the power source voltage (see Fuel Injector Power Source Voltage Inspection).

Fuel Injectors

Fuel Injector Power Source Voltage Inspection

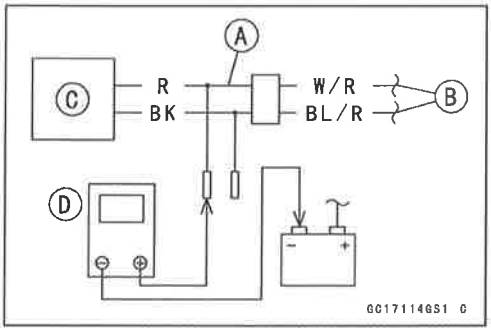


NOTE

○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the throttle body assy (see Throttle Body Assy Removal).
- Connect the throttle body subharness connector [A] temporarily.

- Connect the measuring adapter [A] between the fuel injector connectors as shown.
  Subharness [B]
  Fuel Injector #1 [C]



Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter lead.

Fuel Injector Power Source Voltage
Connections to Adapter:
For Fuel Injector #1, #2, #3, #4
Digital Meter (+) → R (subharness W/R) lead
Digital Meter (–) → Frame Ground Terminal

- Measure the power source voltage with the engine stopped.
- Turn the engine stop switch to run position.
- Push and turn the key knob to "ON."

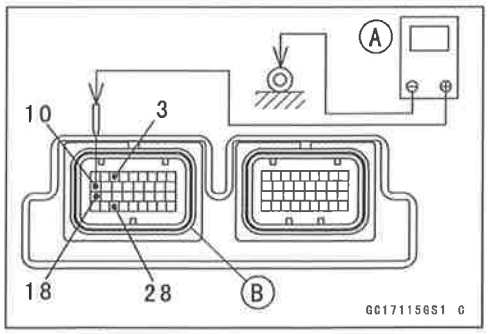
Power Source Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the key knob to "OFF."

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If there is still no battery voltage, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the power source wiring (see Fuel Injector Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the reading is in specification, check the output voltage (see Fuel Injector Output Voltage Inspection).

Fuel Injectors

Fuel Injector Output Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the ECU (see ECU Removal).

○The ECU connector does not need to disconnect.

- Connect a digital meter [A] to the connector [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

Fuel Injector Output Voltage
Connections to ECU Connector:
For Fuel Injector #1
Digital Meter (+) → BL/R lead (ECU terminal 10)
Digital Meter (–) → Frame Ground Terminal
For Fuel Injector #2
Digital Meter (+) → BL/G lead (ECU terminal 18)
Digital Meter (–) → Frame Ground Terminal
For Fuel Injector #3
Digital Meter (+) → BL/BK lead (ECU terminal 3)
Digital Meter (–) → Frame Ground Terminal
For Fuel Injector #4
Digital Meter (+) → BL/Y lead (ECU terminal 28)
Digital Meter (–) → Frame Ground Terminal

- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the engine stop switch to run position.
- Push and turn the key knob to "ON."

Output Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the key knob to "OFF."

★If the reading is in specification, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

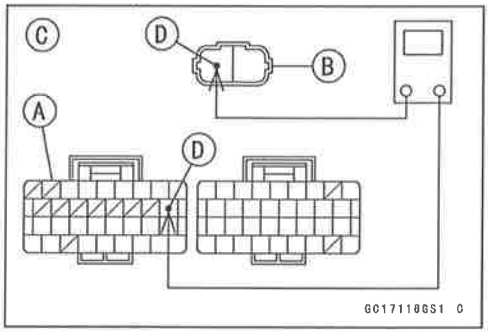
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Fuel Injectors

★If the reading is out of the specification, remove the ECU and check the wiring for continuity between harness connector.

○Disconnect the ECU and injector connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→ Fuel Injector Connector [B]
For Fuel Injector #1 [C]
BL/R lead (ECU Terminal 10) [D]
For Fuel Injector #2
BL/G lead (ECU Terminal 18)
For Fuel Injector #3
BL/BK lead (ECU Terminal 3)
For Fuel Injector #4
BL/Y lead (ECU Terminal 28)



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Fuel Injector Fuel Line Inspection

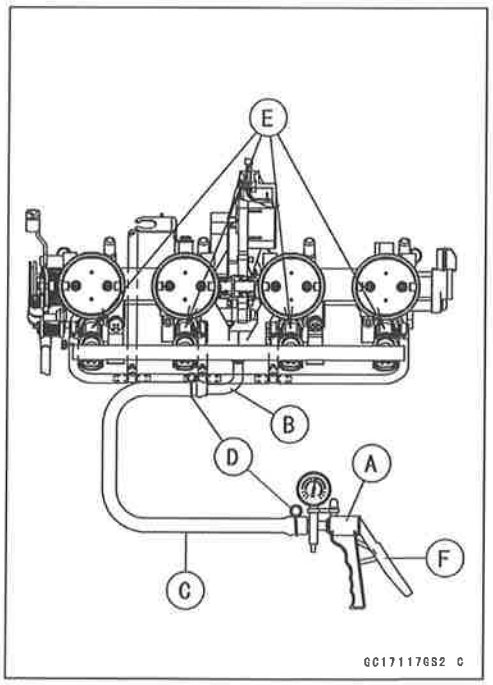
- Remove the throttle body assy (see Throttle Body Assy Removal).
- Check the fuel injector fuel line for leakage as follows.

○Connect a commercially available vacuum/pressure pump [A] to the nipple of the delivery pipe [B] with the fuel hose [C] (both ends connected with the clamps [D]) as shown.

○Apply soap and water solution to the areas [E] as shown.

○Watching the pressure gauge, squeeze the pump lever [F], and build up the pressure until the pressure reaches the maximum pressure.

Fuel Injector Fuel Line Maximum Pressure
Standard: 300 kPa (3.06 kgf/cm², 43 psi)



NOTICE
During pressure testing, do not exceed the maximum pressure for which the system is designed.

○Watch the gauge for at least 6 seconds.

★If the pressure holds steady, the fuel line is good.

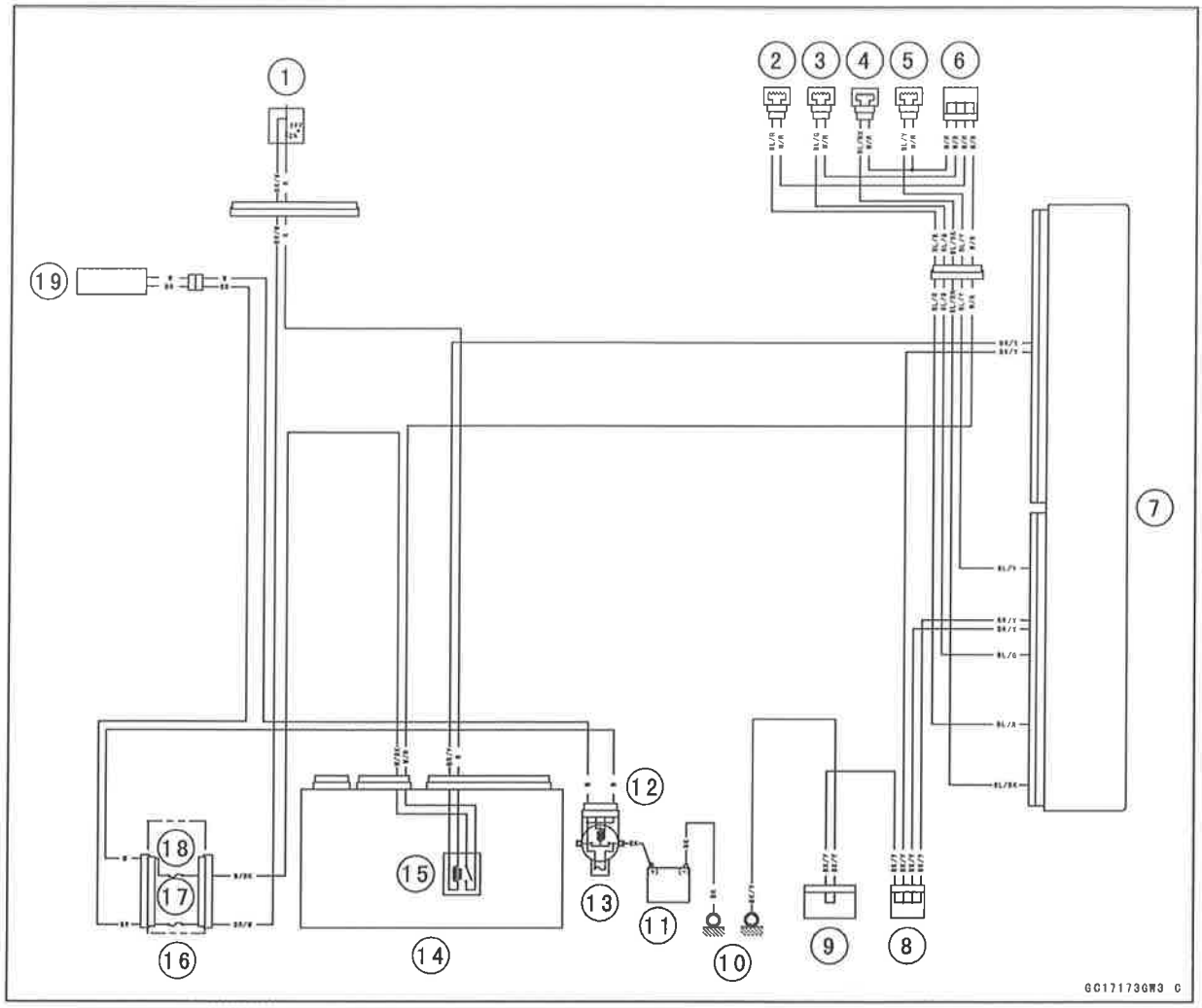
★If the pressure drops at once, or if bubbles are found in the area, the line is leaking. Replace the delivery pipe, injectors and related parts.

○Repeat the leak test, and check the fuel line for no leakage.

- Install the throttle body assy (see Throttle Body Assy Installation).
- Start the engine and check for fuel leakage.

Fuel Injectors

Fuel Injector Circuit



1. Engine Stop Switch
2. Fuel Injector #1
3. Fuel Injector #2
4. Fuel Injector #3
5. Fuel Injector #4
6. Joint Connector A
7. ECU
8. Joint Connector 3
9. Joint Connector 9
10. Frame Ground
11. Battery 12 V 14 Ah
12. Starter Relay
13. Main Fuse 30 A
14. Relay Box
15. Fuel Pump Relay
16. Fuse Box 2
17. Ignition Fuse 15 A
18. ECU Fuse 15 A
19. Steering Lock Unit

Throttle Grip and Cables

Throttle Grip Free Play Inspection

- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter.

Throttle Grip Free Play Adjustment

- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter.

Throttle Cable Installation

- Install the throttle cables in accordance with the Cable, Wire, and Hose Routing section in the Appendix chapter.
- Install the lower ends of the throttle cables in the throttle pulley on the throttle body assy after installing the upper ends of the throttle cables in the grip.
- After installation, adjust each cable properly (see Throttle Control System Inspection in the Periodic Maintenance chapter).

⚠ WARNING

Operation with incorrectly routed or improperly adjusted cables could result in an unsafe riding condition. Be sure the cables are routed correctly and properly adjusted.

Cable Lubrication

- Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

Throttle Body Assy

Idle Speed Inspection/Adjustment

- Refer to the Idle Speed Inspection/Adjustment in the Periodic Maintenance chapter.

Synchronization Inspection/Adjustment

- Refer to the Engine Vacuum Synchronization Inspection in the Periodic Maintenance chapter.

Throttle Body Assy Removal

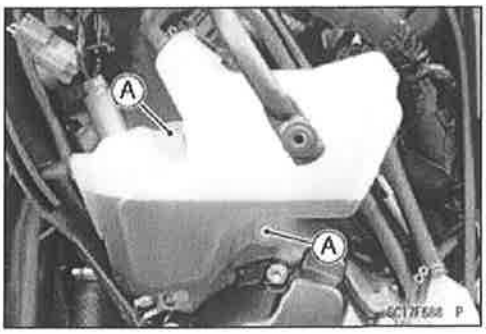
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the key knob off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

NOTICE

Never drop the throttle body assy, especially on a hard surface. Such a shock to the body assy can damage it.

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Subframes (see Left/Right Subframe Removal in the Frame chapter)
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- For CAL, CN, SEA-B1 and TH models, pull off the vacuum hoses from the throttle body assy.
- Remove the coolant reserve tank bolts [A].



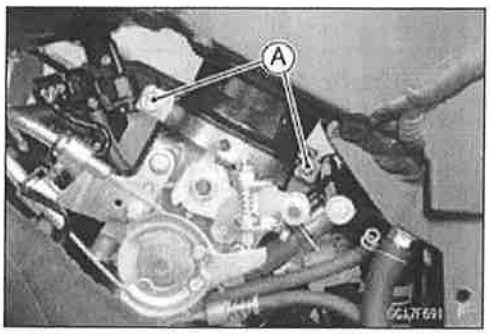
Throttle Body Assy

- Disconnect the throttle body subharness connector [A].

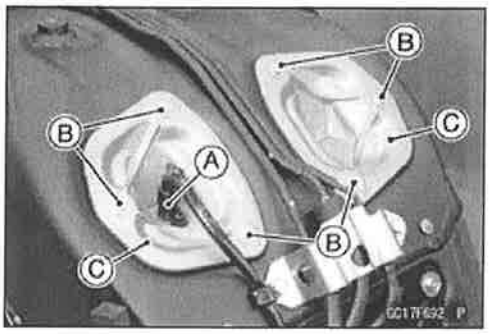
- Take the connector [A] off the connector bracket to the right side of the vehicle.

○Insert the flat tip screwdriver into the connector stopper from the right side of the vehicle.

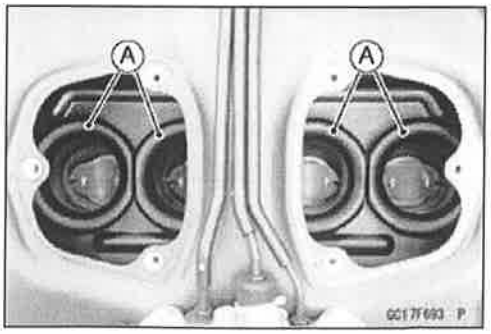
- Loosen the duct clamp bolts [A] on both sides.



- Disconnect the intake air pressure sensor lead connector [A].
- Remove:
  Air Cleaner Cap Bolts [B]
  Left and Right Air Cleaner Caps [C]

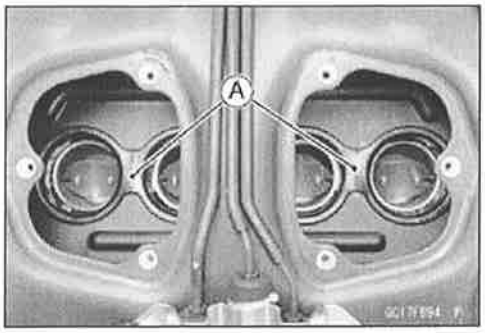


- Pull out the ducts [A] upward.

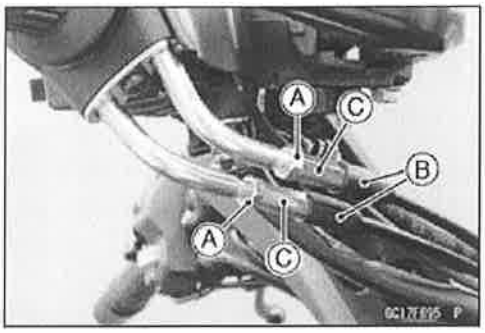


Throttle Body Assy

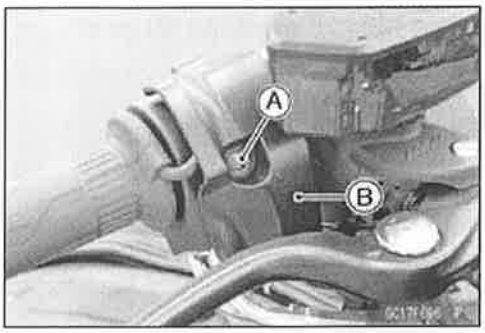
○Remove the grommets [A] as necessary.



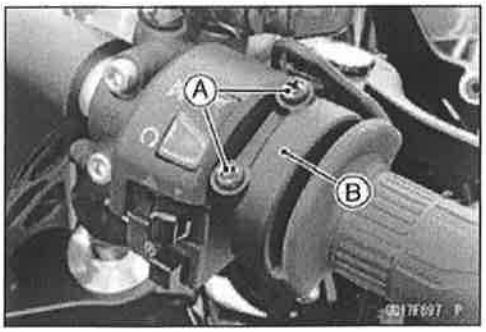
- Loosen the locknuts [A].
- Slide the dust covers [B] and turn the throttle cable adjusters [C] to make a throttle cable slack.



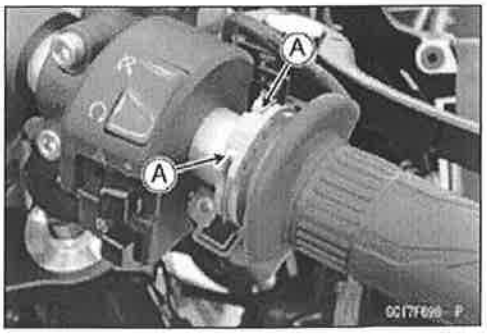
- Remove:
  Throttle Case Cover Screw [A]
  Throttle Case Cover [B]



- Remove:
  Screws [A]
  Upper Throttle Case [B]

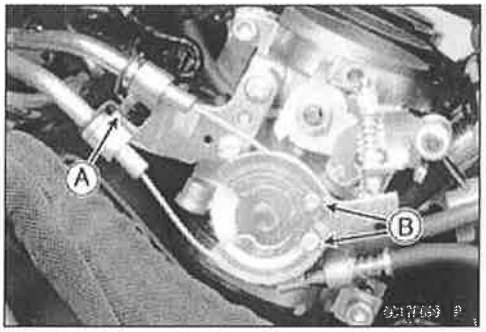


- Remove the throttle cable upper ends [A] from the throttle grip.



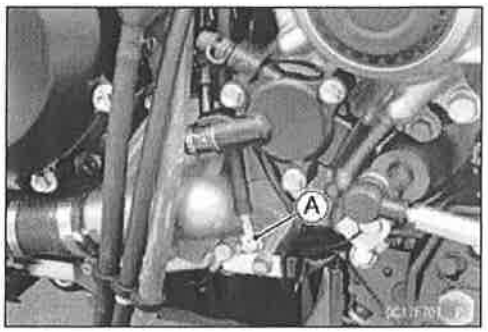
Throttle Body Assy

- Remove:
  Clamp [A]
  Throttle Cable Lower Ends [B]



- Disconnect:
  Air Switching Valve Connector [A]

- Free the idle adjusting screw [A].

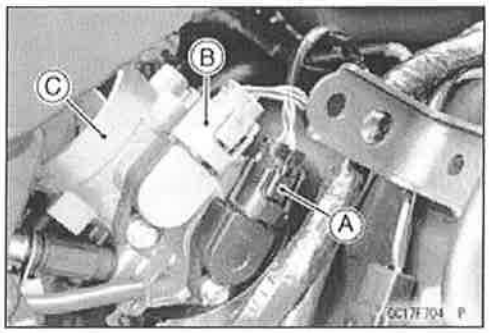


- Loosen the throttle body assy holder clamp bolts [A] on both sides.
- Pull out the throttle body assy [B] from the holder.
- Disconnect the fuel hose joint from the delivery pipe of the throttle body assy (see Fuel Tank Removal).

- Disconnect:
  Water Temperature Sensor Connector [A]

Throttle Body Assy

- Disconnect:
  Main Throttle Sensor Connector [A]
  Subthrottle Sensor Connector [B]
- Remove the throttle body assy [C] to the left side of the motorcycle.
- After removing the throttle body assy, stuff pieces of lint -free, clean cloths into the throttle body assy holders.

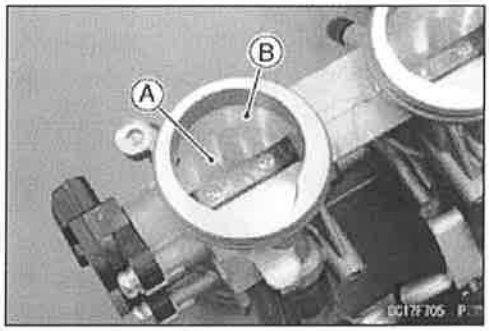


NOTICE
If dirt gets into the engine, excessive engine wear and possible engine damage will occur.

Throttle Body Assy Installation

- Before installing the throttle body assy, check the main throttle valves [A] and throttle bores [B] for carbon deposits.

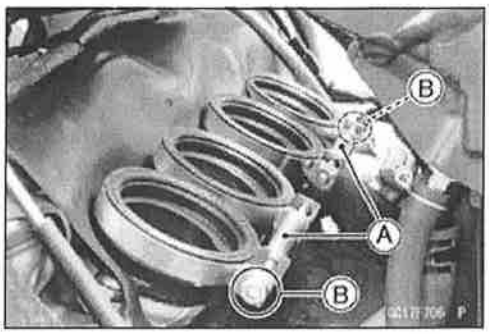
★If any carbon accumulates, wipe off the carbon around the throttle bores and throttle valves, using a cotton pad penetrated with a high flash-point solvent.



- Install the throttle body assy holder clamp bolts [A].

○Face the bolt heads [B] outward.

- Run the cables, leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

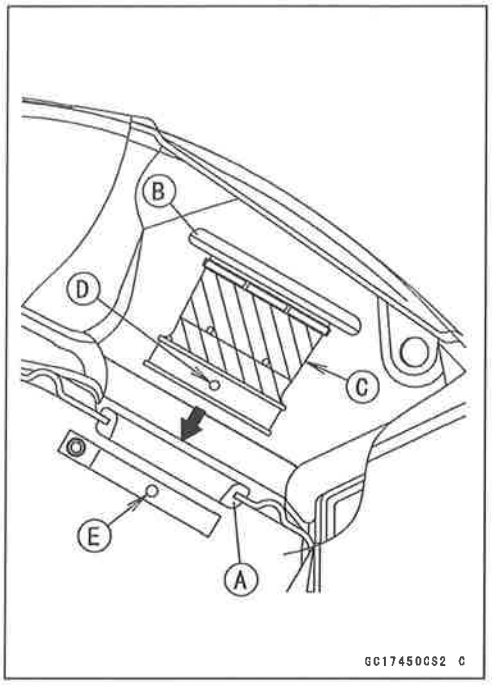


- Connect the fuel hose joint to the delivery pipe of the throttle body assy (see Fuel Tank Installation).
- Tighten:

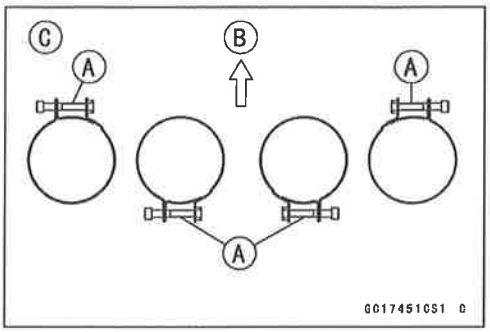
Torque - Throttle Body Assy Holder Clamp Bolts: 2.0 N·m (0.20 kgf·m, 18 in·lb)

Throttle Body Assy

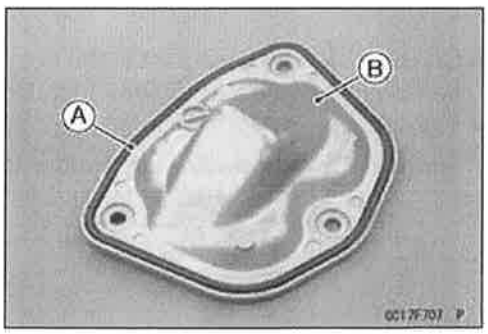
★ If the grommet [A] was removed, install it from the inside of the frame.
★ Insert the duct [B] to the grommet.
○ Apply a soap and water solution or rubber lubricant to the oblique portion [C] on the duct for easy installation.
● Fit the projections [D] of the duct into the holes [E] of the clamp.



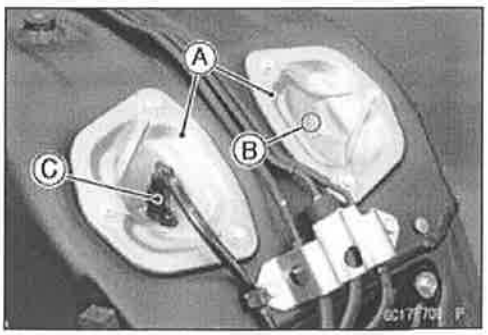
● Install the duct clamp bolts [A] in the direction as shown.
Front [B]
Upside View [C]
● Tighten:
Torque - Duct Clamp Bolts: 2.0 N·m (0.20 kgf·m, 18 in·lb)



● Apply grease to the dust seal [A] on the air cleaner cap [B].

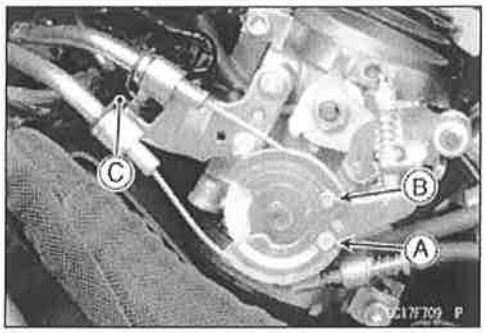


● Install the air cleaner caps [A].
○ The right air cleaner cap has a "R" mark [B].
● Connect the intake air temperature sensor lead connector [C].
● Tighten:
Torque - Air Cleaner Cap Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)



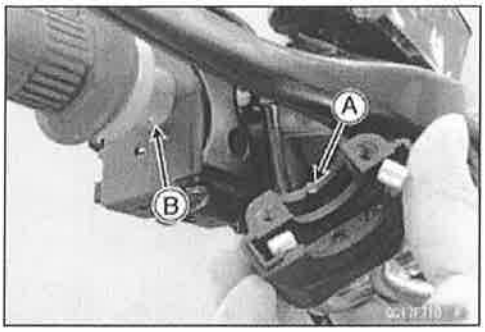
Throttle Body Assy

- Apply a thin coat of grease to the throttle cable lower ends.
- Fit the accelerator cable end [A] and the decelerator cable end [B] into the throttle pulley.
- Hold the throttle cables with the clamp [C], and hook its clamp to the hole of the throttle body assy.



- Fit the projection [A] of the throttle case into the hole [B] of the handlebar.
- Apply a thin coat of grease to the throttle cable upper ends.
- Install the upper ends of the throttle cables in the grip.
- Turn the throttle grip and make sure that the throttle pulley moves smoothly and return by spring force.
- Tighten:

Torque - Throttle Case Cover Screw: 3.0 N·m (0.31 kgf·m, 27 in·lb)



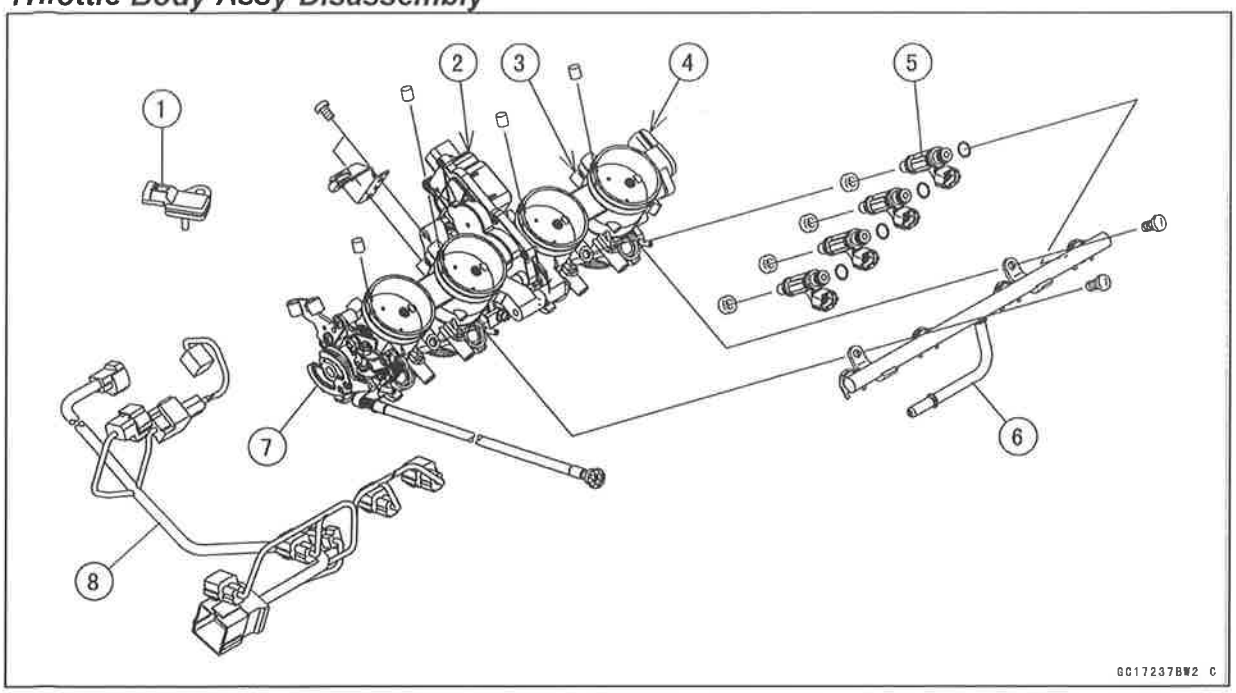
- Apply a non-permanent locking agent to the threads of the coolant reserve tank bolts and tighten them.

Torque - Coolant Reserve Tank Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)

- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Adjust:
  Throttle Grip Free Play (see Throttle Control System Inspection in the Periodic Maintenance chapter)
  Idle Speed (see Idle Speed Adjustment in the Periodic Maintenance chapter)
- Install the removed parts (see appropriate chapters).

Throttle Body Assy

Throttle Body Assy Disassembly

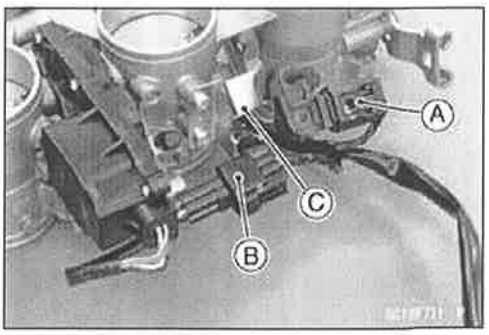


1. Intake Air Pressure Sensor
2. Subthrottle Valve Actuator
3. Main Throttle Sensor
4. Subthrottle Sensor
5. Fuel Injectors
6. Delivery Pipe
7. Throttle Body Assy
8. Throttle Body Subharness

NOTICE

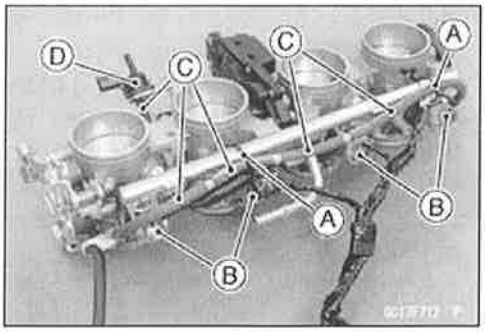
Do not remove, disassemble or adjust the main throttle sensor, subthrottle sensor, subthrottle valve actuator, throttle link mechanism and throttle body assy, because they are adjust or set surely at the manufacturer. Adjustment of these parts could result in poor performance, requiring replacement of the throttle body assy.

- Disconnect:
  Intake Air Pressure Sensor Connector [A]
  Subthrottle Valve Actuator Lead Connector [B]
- Take the subthrottle valve actuator lead connector off the bracket [C].



Throttle Body Assy

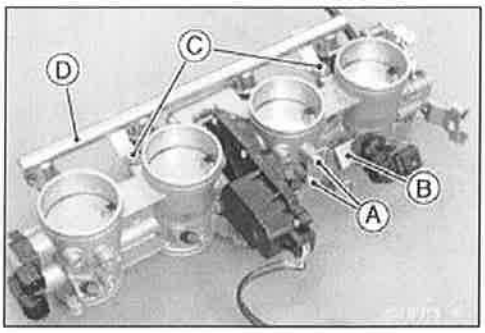
- Remove the clamps [A].
- Disconnect the fuel injector connectors [B].
- Separate the hoses [C] from the throttle body fittings and intake air pressure sensor [D].



- Remove:
  Intake Air Temperature Sensor Bracket Screws [A]
  Bracket [B] with Intake Air Pressure Sensor
  Delivery Pipe Screws [C]
- Pull out the fuel injectors from the throttle body assy together with the delivery pipe [D].

NOTE

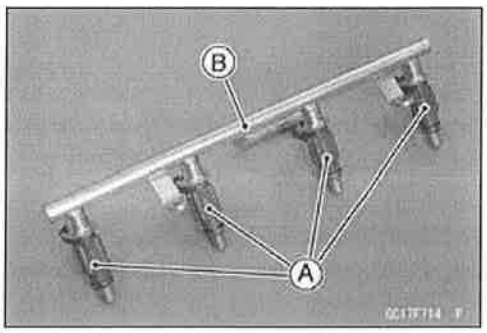
○*Do not damage the insertion portions of the fuel injectors when they are pulled out from the throttle body.*



- Pull out the fuel injectors [A] from the delivery pipe [B].

NOTE

○*Do not damage the insertion portions of the fuel injectors when they are pulled out from the delivery pipe.*

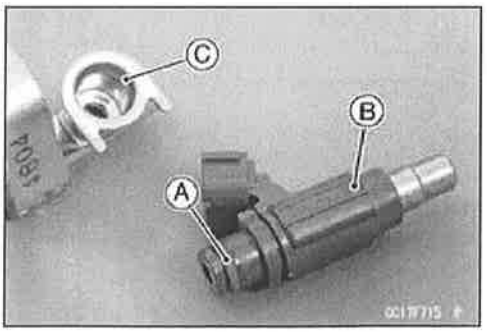


NOTICE

Never drop the fuel injector, especially on a hard surface. Such a shock to the fuel injector can damage it.

Throttle Body Assy Assembly

- Before assembling, blow away dirt or dust from the throttle body and delivery pipe by applying compressed air.
- Replace the O-rings [A] of each fuel injector [B] with new ones.
- Apply engine oil to the new O-rings, insert them to the delivery pipe [C] and confirm whether the fuel injectors turn smoothly or not.

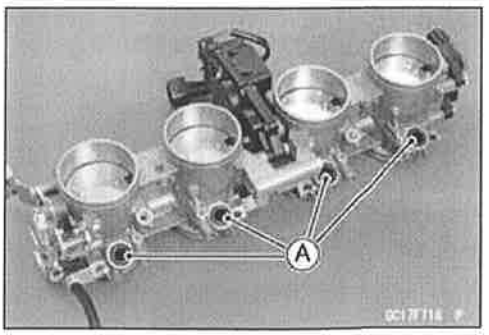


- Replace the dust seals [A] with new ones.
- Apply engine oil to the new dust seals.
- Install the fuel injectors along with the delivery pipe to the throttle body.
- Tighten:

Torque - Delivery Pipe Mounting Screws: 5.0 N·m (0.51 kgf·m, 44 in·lb)

- Install the intake air pressure sensor bracket.
- Tighten:

Torque - Intake Air Pressure Sensor Bracket Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)

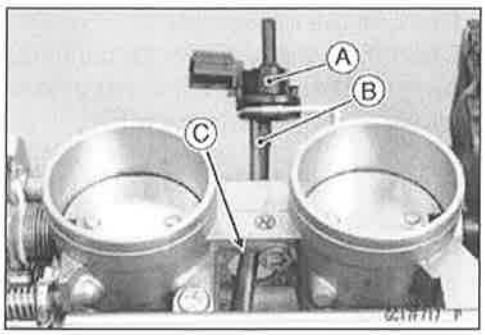


Throttle Body Assy

- Install the each hose to the throttle body assy fittings and intake air pressure sensor [A].

○Run the hose [B] to the hole [C] of the throttle body assy.

- Install the throttle body assy (see Throttle Body Assy Installation).



Air Cleaner

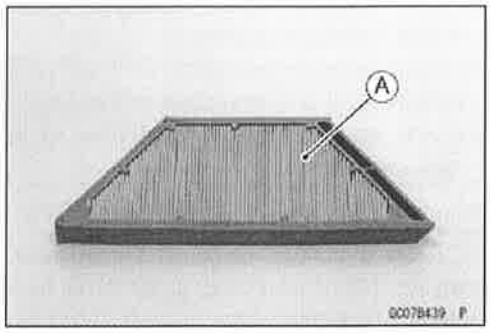
Air Cleaner Element Removal/Installation

- Refer to the Air Cleaner Element Replacement in the Periodic Maintenance chapter.

Air Cleaner Element Inspection

- Remove the air cleaner element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter).
- Visually check the element [A] for tears or breaks.

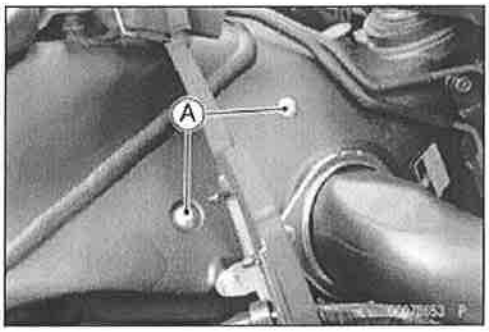
★If the element has any tears or breaks, replace the element.



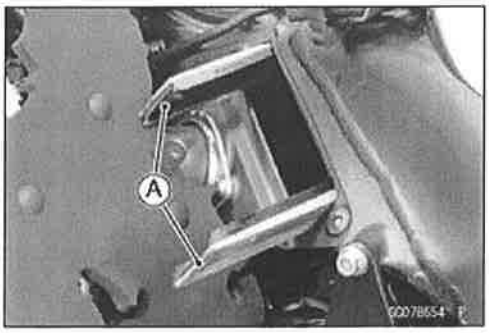
Air Cleaner Element Holder Removal

- Remove:

  Air Cleaner Element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter)
  Right Rear Middle Fairing (see Rear Middle Fairing Removal in the Frame chapter)
  Screws [A]



- Pull out the air cleaner element holder [A] from the housing.

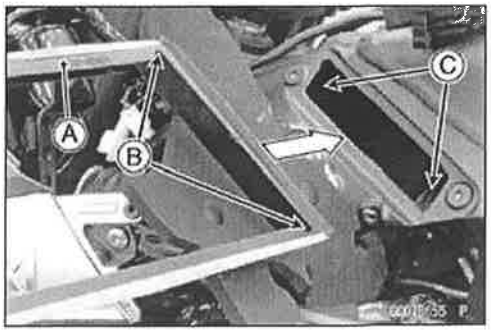


Air Cleaner Element Holder Installation

- Install the air cleaner element holder [A] so that the holder ends [B] insert along the ribs [C] in the housing.
- Tighten:

  Torque - Air Cleaner Element Holder Screws: 6.9 N·m (0.70 kgf·m, 61 in·lb)

- Install the removed parts (see appropriate chapters).



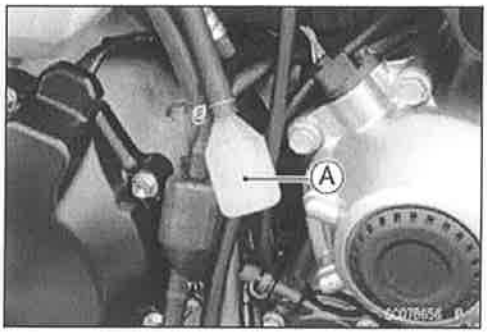
Air Cleaner

Air Cleaner Oil Draining

A drain hose is connected to the bottom of the air cleaner part to drain water or oil accumulated in the cleaner part.

- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Visually check the catch tank [A] of the drain hose, if the water or oil accumulates in the tank.

★If any water or oil accumulates in the tank, remove the tank and drain it.



⚠ WARNING

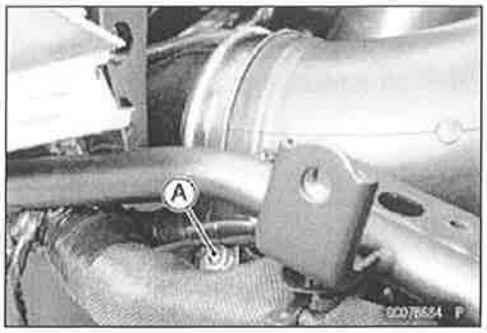
Oil on tires will make them slippery and can cause an accident and injury. Be sure to reinstall the catch tank after draining.

Air Line

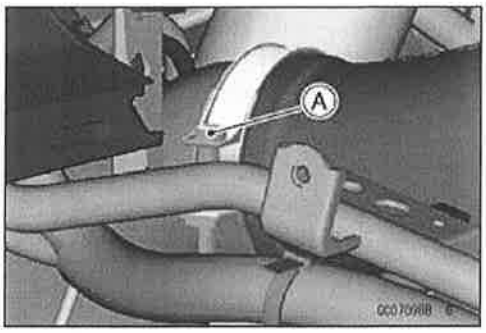
Rear Air Intake Duct Removal

Left Rear Air Intake Duct

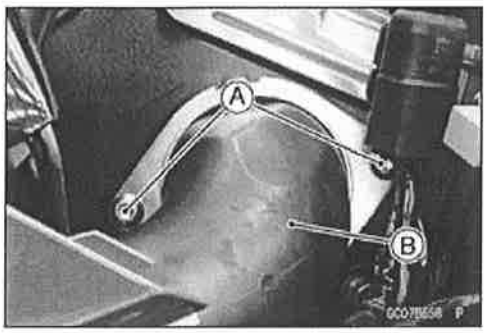
- Remove the left front middle fairing (see Front Middle Fairing Removal in the Frame chapter).
- Loosen the clamp bolt [A]. (Frame No. ~ 001692)



- Loosen the clamp bolt [A]. (Frame No. 001693 ~)

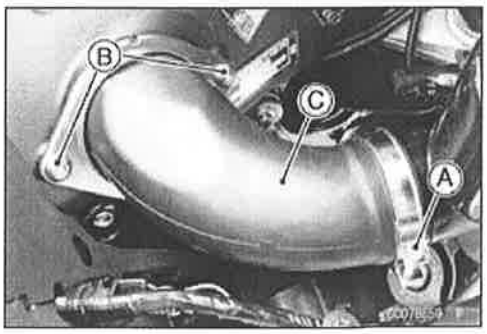


- Remove the mounting bolts [A] and pull off the rear air intake duct [B] backward.



Right Rear Air Intake Duct

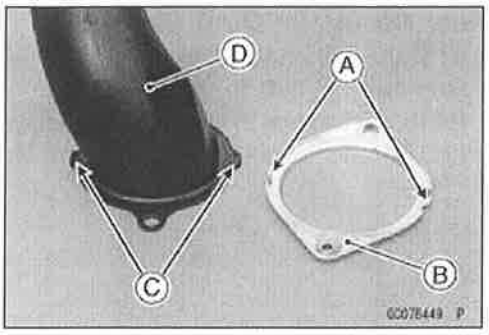
- Remove the right front middle fairing (see Front Middle Fairing Removal in the Frame chapter).
- For CAL, CN, SEA-B1 and TH models, remove the canister (see Evaporative Emission Control System Inspection in the Periodic Maintenance chapter).
- Loosen the clamp bolt [A].
- Remove the mounting bolts [B] and pull off the rear air intake duct [C] backward.



Air Line

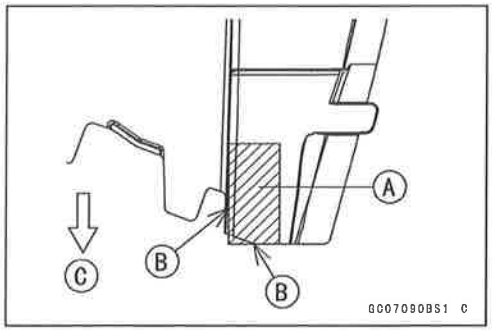
Rear Air Intake Duct Installation

- Fit the projections [A] of the holder [B] into the slots [C] of rear air intake duct [D].



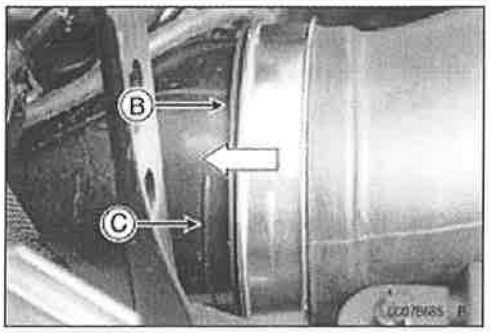
(Frame No. ~ 001692)

- When installing the damper [A] below the left rear air intake duct, align it with the edge and corner [B] of the cover.
  Front [C]



- Insert the rear air intake duct [A] until the duct end [B] aligns with the line [C] of the front air intake duct.
- Apply a non-permanent locking agent to the rear air intake duct mounting bolts and tighten them.

  Torque - Rear Air Intake Duct Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



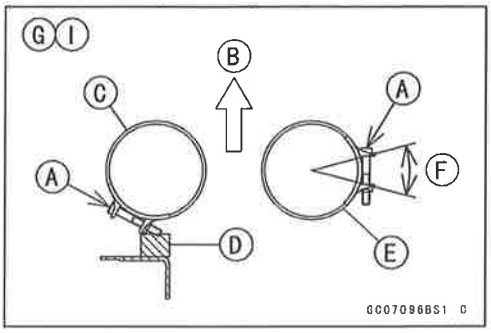
- Install the air intake duct clamp bolts in the direction as shown.
  Bolt Heads [A]
  Upper Side [B]
  Left Clamp [C]
  Damper [D]
  Right Clamp [E]
  About 30° [F]
  Rear View [G]
  Left Fairing Stay [H]
  Frame No. ~ 001692 [I]
  Frame No. 001693 ~ [J]

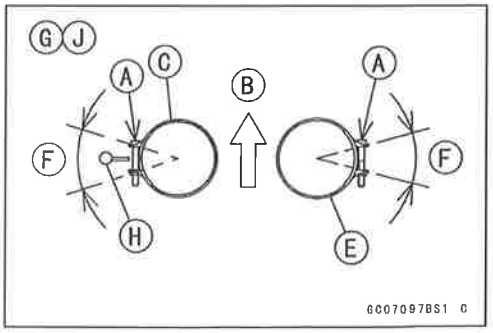
○The left clamp must not come in contact with the left fairing stay.

- Tighten:

  Torque - Air Intake Duct Clamp Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)

- Install the removed parts (see appropriate chapters).

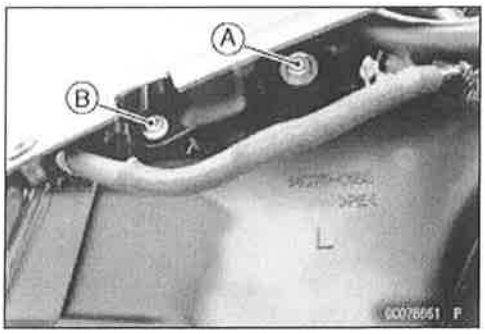




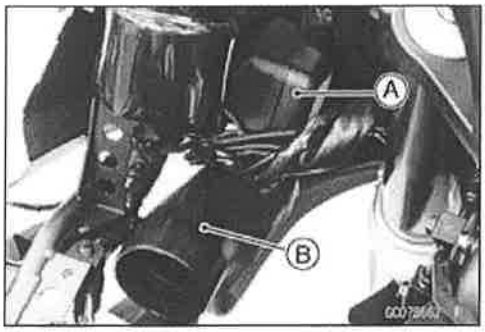
Air Line

Front Air Intake Duct Removal

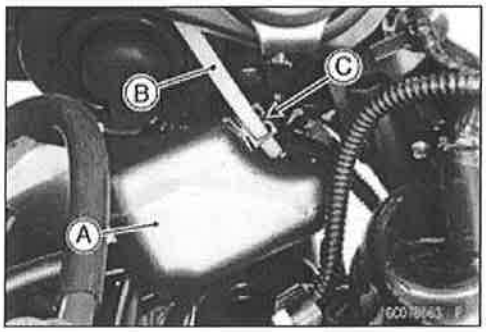
- Remove:
  Rear Air Intake Duct (see Rear Air Intake Duct Removal)
  Front Air Intake Duct Mounting Bolt [A]
  Resonator Mounting Bolt [B]



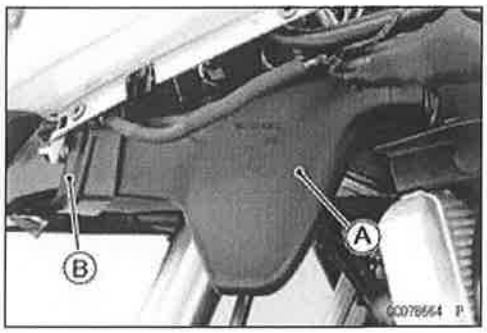
- Pull off the resonator [A] from the front air intake duct [B].



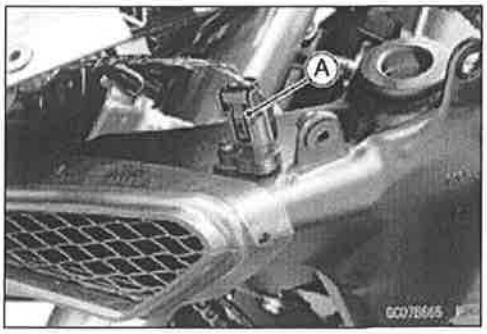
- For the right resonator [A], free the headlight aiming cable [B] from the clamp [C] of the resonator.



- Remove the front air intake duct [A] and the rubber seal [B].



- For the left front air intake duct, disconnect the outside temperature sensor connector [A].

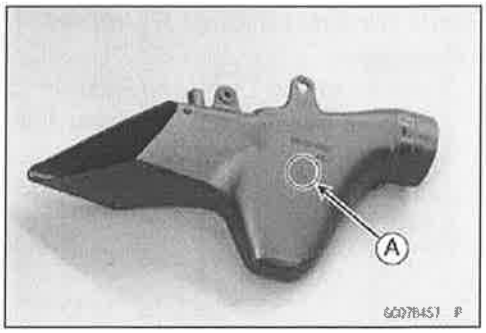


Air Line

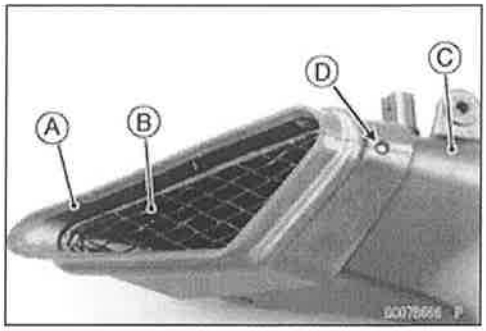
Front Air Intake Duct Installation

NOTE

○*The left front air intake duct has a "L" mark [A] and the right front air intake duct has a "R" mark.*

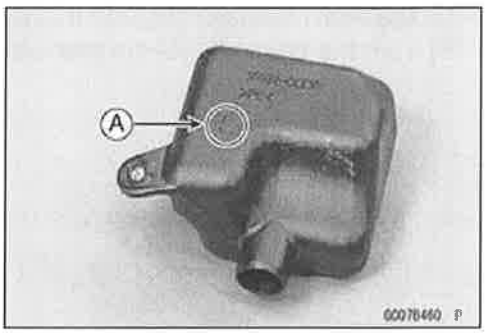


- Install the rubber seal [A] together with the screen [B] to the front air intake duct [C].
- Fit the hole [D] of the rubber seal to the projection of the front air intake duct.
- For the left front air intake duct, connect the outside temperature sensor connector.
- Install the front air intake duct to the fairing.



NOTE

○*The left resonator has a "L" mark [A] and the right resonator has a "R" mark.*



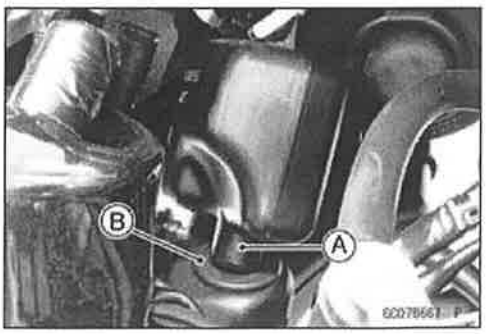
- Install the resonator as follows.

○Insert the fitting [A] of the resonator into the grommet [B] on the front air intake duct.

○For the right resonator, hold the headlight aiming cable with the clamp of the resonator.

○Tighten:

Torque - Resonator Mounting Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)



- Tighten:

Torque - Front Air Intake Duct Mounting Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)

- Install the removed parts (see appropriate chapters).

Fuel Tank

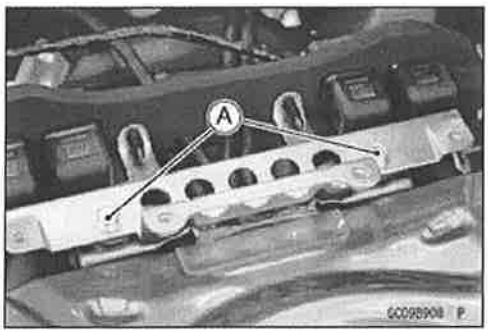
Fuel Tank Removal

⚠ WARNING

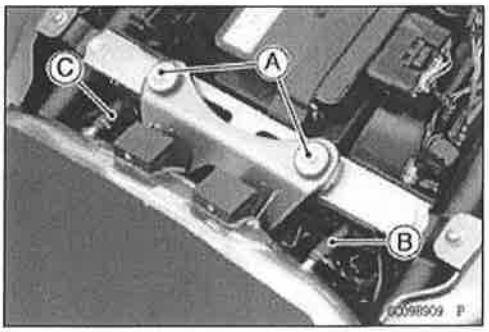
Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the key knob off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Turn the key knob to "OFF."
- Wait until the engine cools down.
- Disconnect the battery (–) terminal (see Battery Removal in the Electrical System chapter).

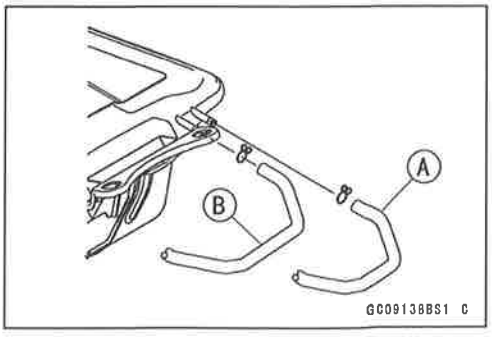
- Remove:
  Rear Middle Fairings (see Rear Middle Fairing Removal in the Frame chapter)
  Front Fuel Tank Cover (see Front Fuel Tank Cover Removal in the Frame chapter)
  Fuel Tank Bolts [A]



- Remove:
  Fuel Tank Bolts [A]
- Disconnect:
  Drain Hose [B]
  Breather Hose [C]

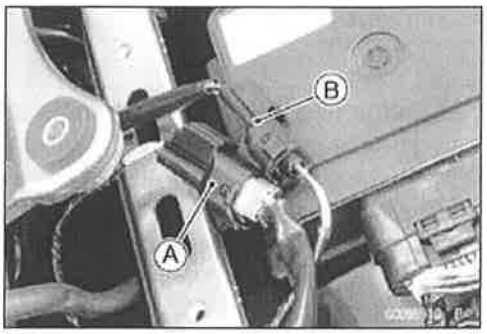


- For CAL, CN, SEA-B1 and TH models, disconnect the following hoses.
  Fuel Return Hose [A] (Right Side, Red)
  Fuel Tank Breather Hose [B] (Left Side, Blue)



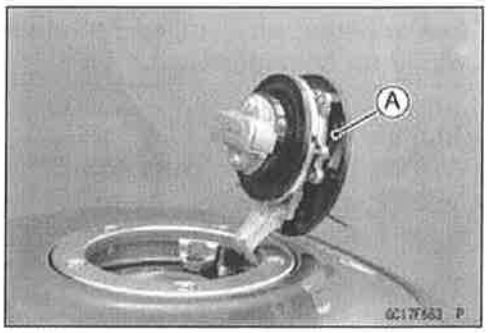
Fuel Tank

- Disconnect:
  Fuel Pump Lead Connector [A]
  Fuel Level Sensor Lead Connector [B]



- Open the fuel tank cap [A] to lower the pressure in the tank.

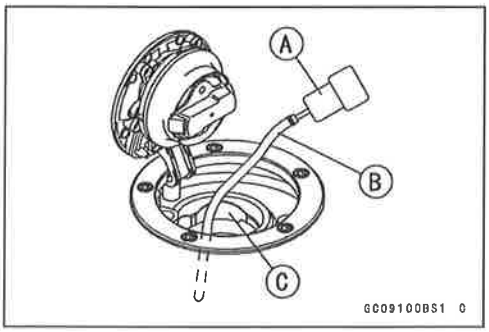
○During tank removal, keep the tank cap open to release pressure in the tank. This makes fuel spillage less.



- Draw the fuel out from the fuel tank with a commercially available pump [A].

○Use a soft plastic hose [B] as a pump intake hose in order to insert the hose smoothly.

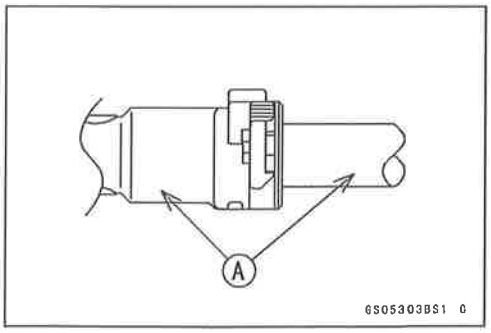
○Put the hose through the fill opening [C] into the tank and draw the fuel out.



⚠ WARNING

Spilled fuel is flammable and can be explosive under certain conditions. The fuel can not be removed completely from the fuel tank. Be careful for remained fuel spillage.

- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.



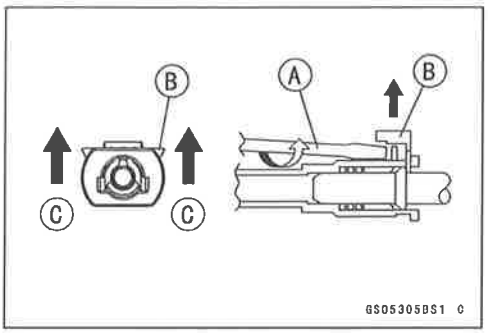
Fuel Tank

When removing with flat tip screwdriver

- Insert the flat tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.

When removing with fingers

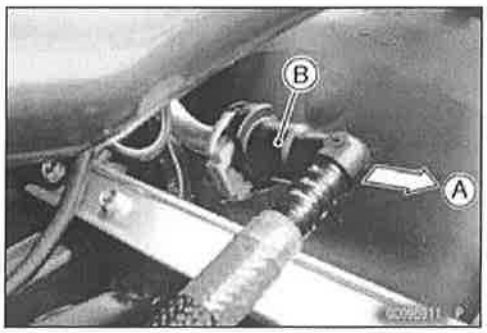
- Open and push up [C] the joint lock with your fingers.



NOTICE

Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively widen the joint lock ends when removing the fuel hose. The joint lock has a retaining edge that locks around the housing.

- Pull [A] the fuel hose joint [B] out of the outlet pipe.



NOTICE

When removing the fuel hose joint, do not apply strong force to the outlet pipe on the fuel pump. The pipe made from resin could be damaged.

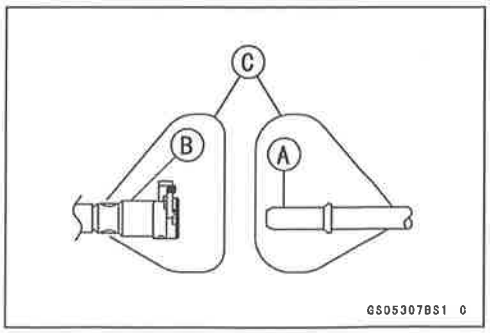
⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

- Close the fuel tank cap.
- Remove the fuel tank, and place a it on a flat surface.

○Do not apply the load to the fuel outlet pipe of the fuel pump.

- Clean the pipe [A].
- Cover the pipe and the hose joint [B] with the vinyl bags [C] to keep it clean.



Fuel Tank

• For CAL, CN, SEA-B1 and TH models, note the following.

NOTICE

For the CAL, CN, SEA-B1 and TH models, if gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated, replace it with a new one.

○Be sure to plug the evaporative fuel return hose to prevent fuel spilling before fuel tank removal.

⚠ WARNING

Spilled fuel is flammable and can be explosive under certain conditions. For CAL, CN, SEA-B1 and TH models, be careful not to spill fuel through the return hose.

★If liquid or gasoline flows into the breather hose, remove the hose and blow it clean with compressed air.

○Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump.

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Store the fuel tank in an area which is well-ventilated and free from any source of flame or sparks. Do not smoke in this area. Place the fuel tank on a flat surface and plug the fuel pipes to prevent fuel leakage.

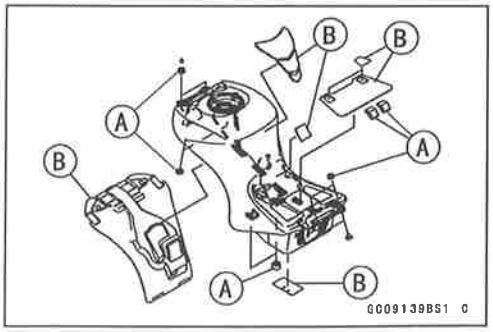
Fuel Tank Installation

• Note the above WARNING (see Fuel Tank Removal).

• Check that the dampers [A] and pad [B] are in place on the fuel tank as well.

★If the dampers are damaged or deteriorated, replace them.

• Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



• For CAL, CN, SEA-B1 and TH models, note the following.

○To prevent the gasoline from flowing into or out of the canister, hold the separator perpendicular to the ground.

○Connect the hoses according to the diagram of the system (see Cable, Wire, and Hose Routing section in the Appendix chapter). Make sure they do not get pinched or kinked.

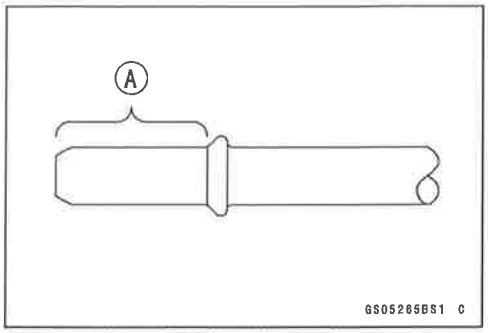
○Run the hoses with a minimum of bending so that the air or vapor will not be obstructed.

Fuel Tank

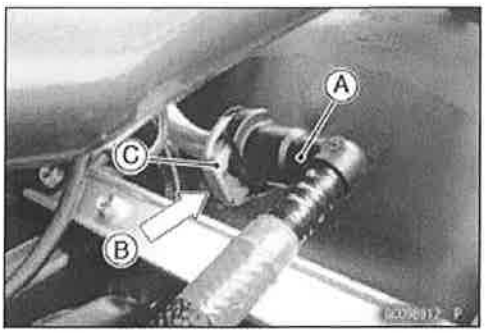
- Remove the vinyl bag on the pipe and fuel hose joint.
- Check the joint lock for deformation and wear.

★If the joint lock is deformed, replace the fuel hose with a new one.

- Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].
- Apply engine oil to the pipe.



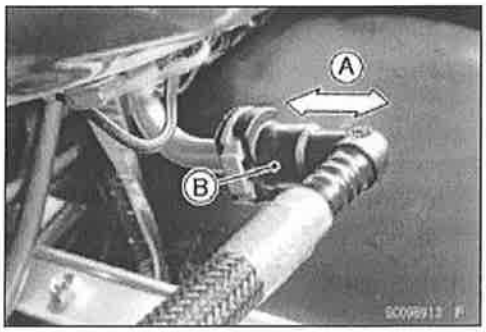
- Insert the fuel hose joint [A] straight onto the fuel outlet pipe until the hose joint clicks.
- Push [B] the joint lock [C] until the hose joint clicks.



- Push and pull [A] the hose joint [B] back and forth more than two times and make sure it is locked and does not come off.

⚠ WARNING

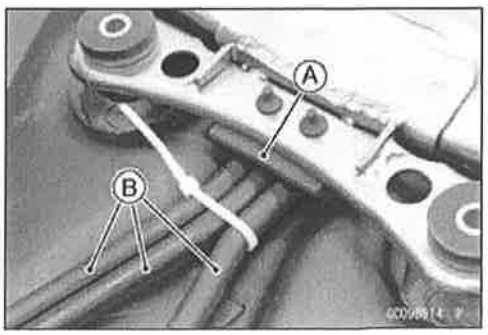
Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe.



★If it comes off, reinstall the hose joint.

- Connect the fuel pump, fuel level sensor lead connectors and the battery (–) terminal (see Battery Installation in the Electrical System chapter).

- Fit the groove of the damper [A] on the brake pipes [B].

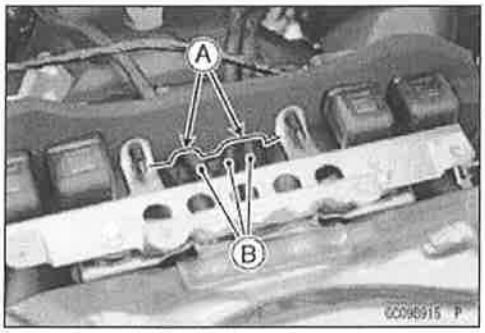


Fuel Tank

- Fit the grooves of the pad [A] on the brake pipes [B].
- Tighten:

Torque - Fuel Tank Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)

- Install the removed parts (see appropriate chapters).



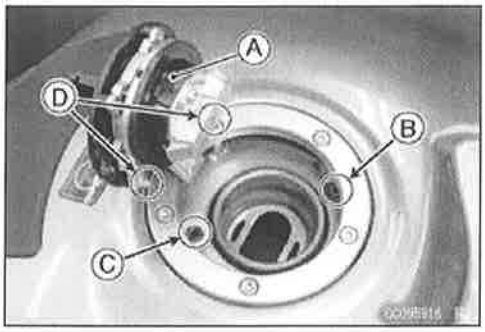
Fuel Tank and Cap Inspection

- Open the fuel tank cap.
- Visually inspect the gasket [A] on the tank cap for any damage.

★Replace the gasket if it is damaged.

- Check to see if the water drain pipe [B] and fuel breather pipe [C] in the tank are not clogged. Check the tank cap breather also.

★If they are clogged, remove the tank and drain it, and then blow the breather free with compressed air.



NOTICE

Do not apply compressed air to the air vent holes [D] in the tank cap. This could cause damage and clogging of the labyrinth in the cap.

Fuel Tank Cleaning

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area. Do not use gasoline or low flash-point solvents to clean the tank.

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Fuel Pump (see Fuel Pump Removal)
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Draw the solvent out of the fuel tank.
- Dry the tank with compressed air.
- Install:
  Fuel Pump (see Fuel Pump Installation)
  Fuel Tank (see Fuel Tank Installation)

Evaporative Emission Control System (CAL, CN, SEA-B1 and TH Models)

The Evaporative Emission Control System routes fuel vapors from the fuel system into the running engine or stores the vapors in a canister when the engine is stopped. Although no adjustments are required, a thorough visual inspection must be made at the intervals specified by the Periodic Maintenance Chart.

Parts Removal/Installation

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the key knob off. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

NOTICE

If gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated, replace it with a new one.

- To prevent the gasoline from flowing into or out of the canister, hold the separator perpendicular to the ground.
- Connect the hoses according to the diagram of the system (see Cable, Wire, and Hose Routing section in the Appendix chapter). Make sure they do not get pinched or kinked.

Hose Inspection

- Refer to the Evaporative Emission Control System Inspection (CAL, CN, SEA-B1 and TH Models) in the Periodic Maintenance chapter.

Separator Inspection

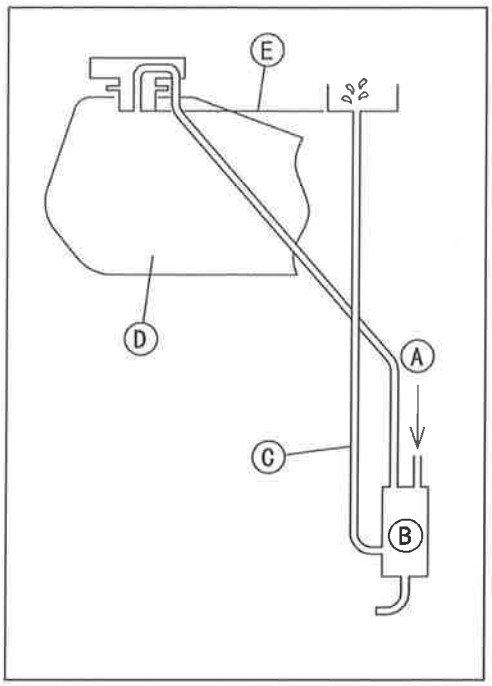
- Refer to the Evaporative Emission Control System Inspection (CAL, CN, SEA-B1 and TH Models) in the Periodic Maintenance chapter.

Evaporative Emission Control System (CAL, CN, SEA-B1 and TH Models)

Separator Operation Test

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the key knob off. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.



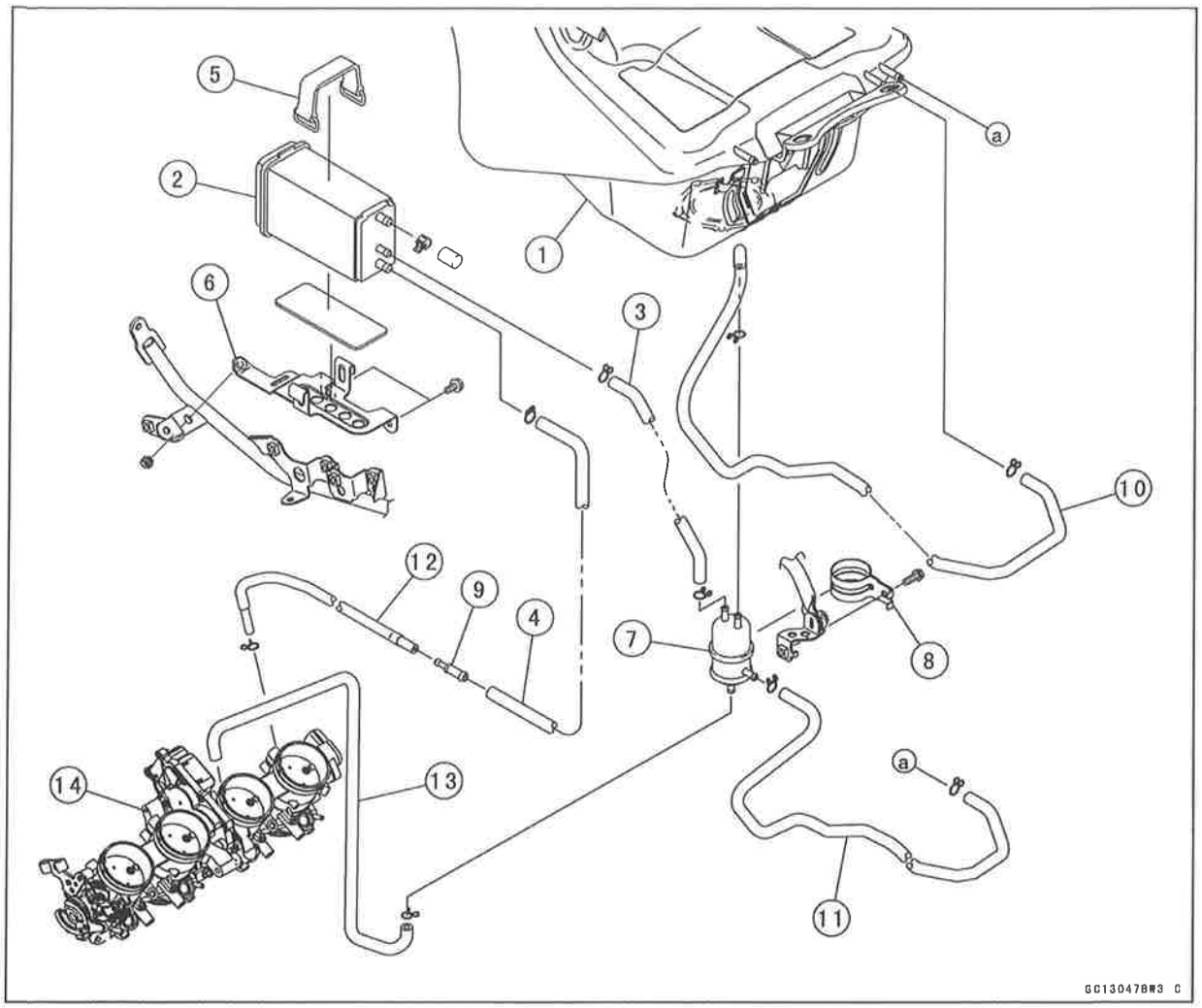
- Connect the hoses to the separator, and install the separator on the motorcycle.
- Disconnect the breather hose from the separator, and inject about 20 mL (0.68 US oz.) of gasoline [A] into the separator [B] through the hose fitting.
- Disconnect the fuel return hose [C] from the fuel tank [D].
- Run the open end of the return hose into the container and hold it level with the tank top [E].
- Start the engine, and let it idle.

★ If the gasoline in the separator comes out of the hose, the separator works well. If it does not, replace the separator with a new one.

Canister Inspection

- Refer to the Evaporative Emission Control System Inspection (CAL, CN, SEA-B1 and TH Models) in the Periodic Maintenance chapter.

Evaporative Emission Control System (CAL, CN, SEA-B1 and TH Models)



1. Fuel Tank
2. Canister
3. Blue Hose (Breather)
4. Green Hose (Purge)
5. Band (for Canister)
6. Bracket (for Canister)
7. Separator
8. Bracket (for Separator)
9. Fitting
10. Blue Hose (Breather)
11. Red Hose (Return)
12. Green Hose (Purge)
13. White Hose (Vacuum)
14. Throttle Body Assy

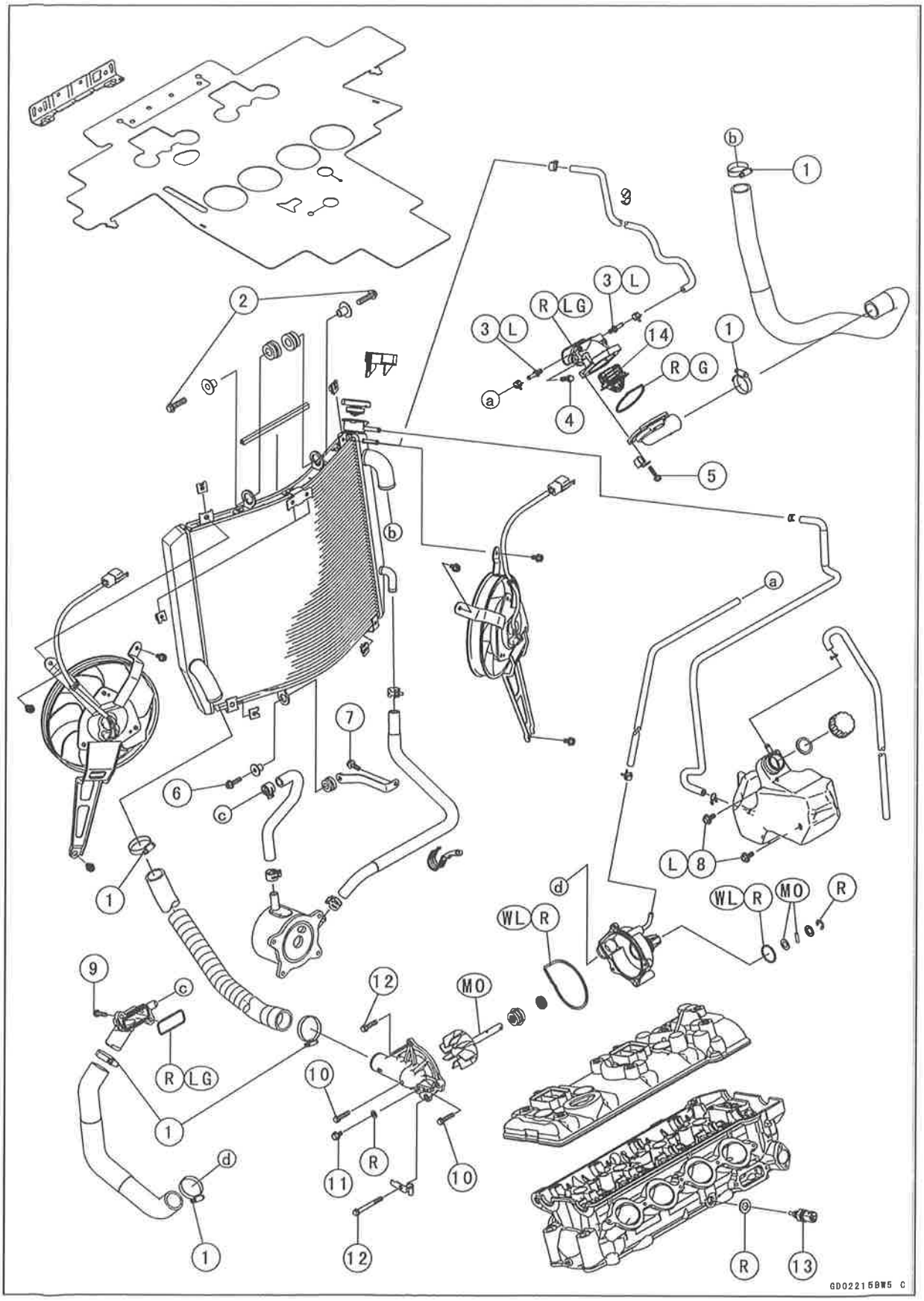
Cooling System

Table of Contents

Exploded View 4-2
Coolant Flow Chart 4-4
Specifications 4-6
Coolant 4-7
  Coolant Deterioration Inspection 4-7
  Coolant Level Inspection 4-7
  Coolant Draining 4-7
  Coolant Filling 4-7
  Pressure Testing 4-7
  Cooling System Flushing 4-8
  Coolant Reserve Tank Removal 4-8
  Coolant Reserve Tank Installation 4-8
Water Pump 4-9
  Water Pump Removal 4-9
  Water Pump Installation 4-9
  Water Pump Inspection 4-10
  Water Pump Disassembly 4-11
  Water Pump Assembly 4-11
  Water Pump Impeller Inspection 4-12
  Mechanical Seal Inspection 4-12
Radiator 4-13
  Radiator and Radiator Fan Removal 4-13
  Radiator and Radiator Fan Installation 4-15
  Radiator Inspection 4-15
  Radiator Cap Inspection 4-16
  Radiator Filler Neck Inspection 4-16
Thermostat 4-17
  Thermostat Removal 4-17
  Thermostat Installation 4-17
  Thermostat Inspection 4-18
Hoses and Pipes 4-19
  Hose Installation 4-19
  Hose Inspection 4-19
Water Temperature Sensor 4-20
  Water Temperature Sensor Removal/Installation 4-20
  Water Temperature Sensor Inspection 4-20

4-2 COOLING SYSTEM

Exploded View

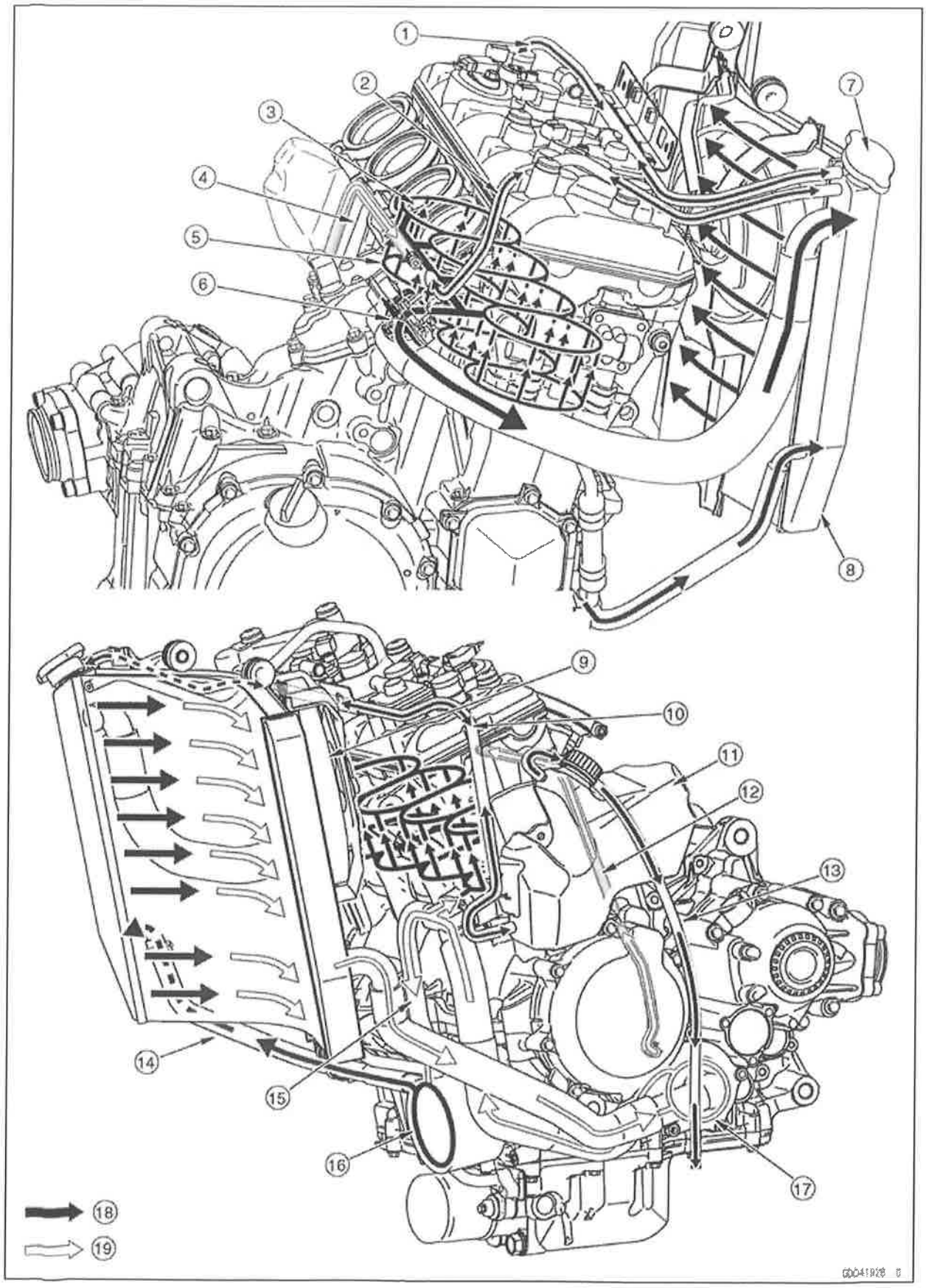


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water Hose Clamp Screws	3.0	0.31	27 in·lb	
2	Radiator Upper Bolts	25	2.5	18	
3	Coolant Fitting Bolt	8.8	0.90	78 in·lb	L
4	Thermostat Housing Mounting Bolts	9.8	1.0	87 in·lb	
5	Thermostat Housing Cover Bolts	5.9	0.60	52 in·lb	
6	Radiator Lower Bolt	9.8	1.0	87 in·lb	
7	Radiator Stay Bolt	9.8	1.0	87 in·lb	
8	Coolant Reserve Tank Bolts	3.9	0.40	35 in·lb	L
9	Cylinder Fitting Bolts	9.8	1.0	87 in·lb	
10	Water Pump Cover Bolts	12	1.2	106 in·lb	
11	Coolant Drain Plug	10	1.0	89 in·lb	
12	Water Pump Mounting Bolts	12	1.2	106 in·lb	
13	Water Temperature Sensor	12	1.2	106 in·lb	

14. Thermostat
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
MO: Apply molybdenum disulfide oil.
(mixture of the engine oil and molybdenum disulfide grease in weight ration 2:1)
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Coolant Flow Chart



Coolant Flow Chart

1. Reserve Tank Hose
2. Air Bleeder Hose for Thermostat Housing
3. Cylinder Head Jacket
4. Air Bleeder Hose for Water Pump
5. Cylinder Jacket
6. Thermostat Housing
7. Radiator Cap
8. Radiator
9. Radiator Fan
10. Reserve Tank Hose
11. Reserve Tank
12. Air Bleeder Hose for Water Pump
13. Reserve Tank Overflow Hose
14. Outlet Hose
15. Intake Hose
16. Oil Cooler
17. Water Pump
18. Hot Coolant
19. Cold Coolant

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump turns and the coolant circulates.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is less than 55°C (131°F), the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than 58 ~ 62°C (136 ~ 144°F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 95°C (203°F), the radiator fan relay conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the coolant temperature is below 90°C (194°F), the fan relay opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank.

The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 93.3 ~ 122.7 kPa (0.95 ~ 1.25 kgf/cm², 13.5 ~ 17.8 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 93.3 ~ 122.7 kPa (0.95 ~ 1.25 kgf/cm², 13.5 ~ 17.8 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

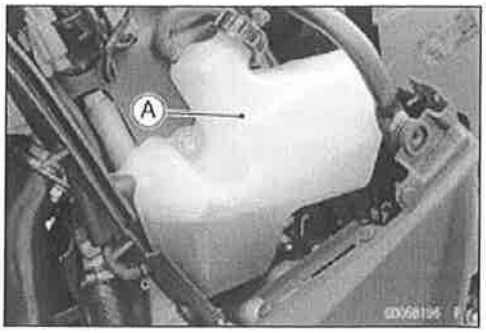
4-6 COOLING SYSTEM

Specifications

Item	Standard
Coolant Provided when Shipping	
Type (Recommended)	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)
Color	Green
Mixed Ratio	Soft water 50%, coolant 50%
Freezing Point	–35°C (–31°F)
Total Amount	3.4 L (3.6 US qt) (Reserve tank full level, including radiator and engine)
Radiator Cap	
Relief Pressure	93.3 ~ 122.7 kPa (0.95 ~ 1.25 kgf/cm², 13.5 ~ 17.8 psi)
Thermostat	
Valve Opening Temperature	58 ~ 62°C (136 ~ 144°F)
Valve Full Opening Lift	8 mm (0.31 in.) or more at 75°C (167°F)

Coolant

Coolant Deterioration Inspection



- Remove:
  Left Rear Middle Fairing (see Rear Middle Fairing Removal in the Frame chapter)
- Visually inspect the coolant in the reserve tank [A].

★If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.

★If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

Coolant Level Inspection

- Refer to the Coolant Level Inspection in the Periodic Maintenance chapter.

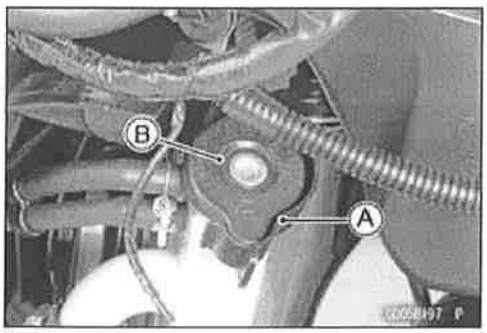
Coolant Draining

- Refer to the Coolant Change in the Periodic Maintenance chapter.

Coolant Filling

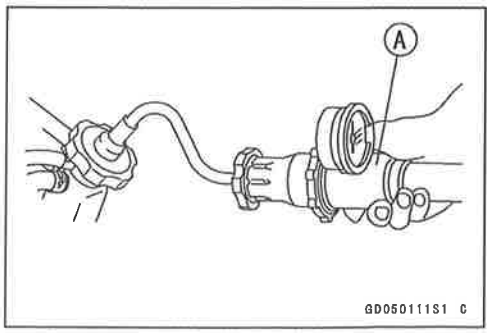
- Refer to the Coolant Change in the Periodic Maintenance chapter.

Pressure Testing



- Remove:
  Right Front Middle Fairing (see Front Middle Fairing Removal in the Frame chapter)
  Radiator Cap Cover [A]
  Radiator Cap [B]

○Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.



- Install the cooling system pressure tester [A] on the filler neck.

NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*

- Build up pressure in the system carefully until the pressure reaches 122.7 kPa (1.25 kgf/cm², 17.8 psi).

NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 122.7 kPa (1.25 kgf/cm², 17.8 psi).

- Watch the gauge for at least 6 seconds.

★If the pressure holds steady, the system is all right.

★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the water pump.

- Remove the pressure tester, replenish the coolant, and install the radiator cap.

Coolant

Cooling System Flushing

Over a period of time, the cooling system accumulates rust, scale, and lime in the water jacket and radiator. When this accumulation is suspected or observed, flush the cooling system. If this accumulation is not removed, it will clog up the water passage and considerable reduce the efficiency of the cooling system.

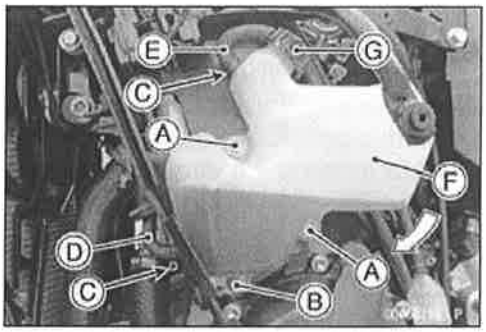
- Drain the cooling system (see Coolant Change in the Periodic Maintenance chapter).
- Fill the cooling system with fresh water mixed with a flushing compound.

NOTICE

Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.

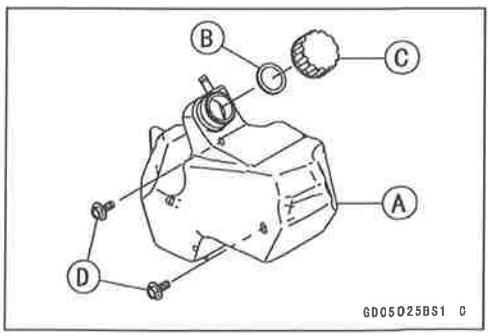
- Warm up the engine, and run it at normal operating temperature for about ten minutes.
- Stop the engine, and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant and bleed the air from the system (see Coolant Change in the Periodic Maintenance chapter).

Coolant Reserve Tank Removal



- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Left Rear Middle Fairing (see Rear Middle Fairing Removal in the Frame chapter)
  Coolant Reserve Tank Bolts [A]
  Bolt [B]
- Turn the coolant reserve tank clockwise.
- Slide the clamps [C].
- Disconnect:
  Reserve Tank Hose [D]
  Reserve Tank Overflow Hose [E]
- Remove the coolant reserve tank [F].
- Remove the cap [G] and poor the coolant into a container.

Coolant Reserve Tank Installation



- Install the following to the coolant reserve tank [A].
  Gasket [B]
  Cap [C]
- Apply a non-permanent locking agent to the threads of the reserve tank bolts [D] and tighten them.

  Torque - Coolant Reserve Tank Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)

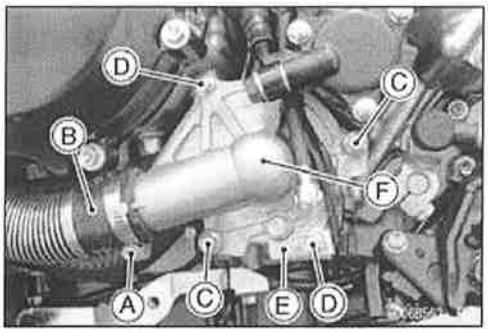
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Fill the coolant reserve tank with coolant (see Coolant Change in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

Water Pump

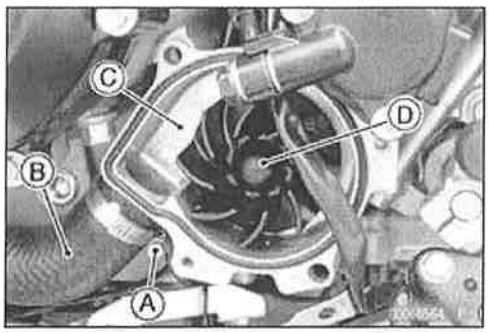
Water Pump Removal

- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)

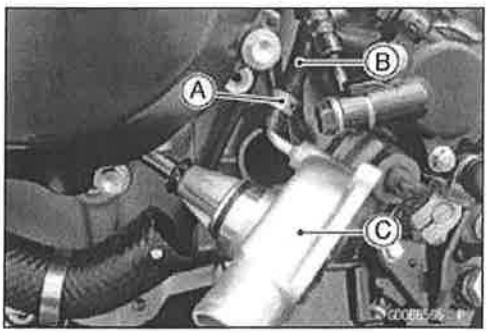
- Loosen the clamp screw [A].
- Disconnect the water hose [B].
- Remove:
  Water Pump Cover Bolts [C]
  Water Pump Mounting Bolts [D]
  Clamp [E]
  Water Pump Cover [F]



- Loosen the clamp screw [A].
- Disconnect the water hose [B].
- Remove the water pump body [C] with impeller [D] from the engine.

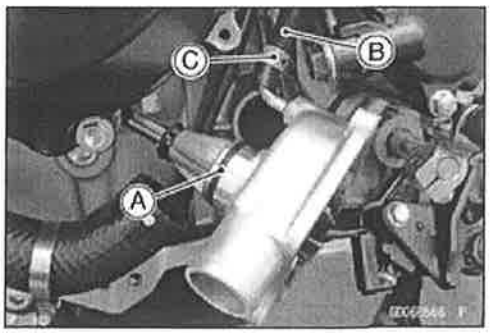


- Slide the clamp [A] and disconnect the air bleeder hose [B] from the water pump body.
- Remove the water pump body [C] with impeller.



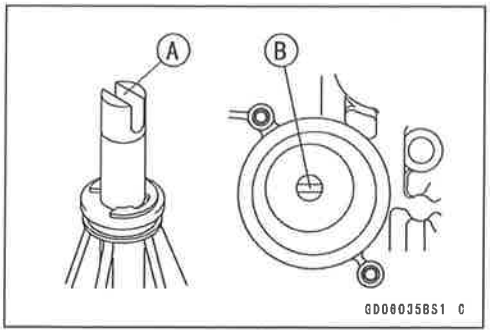
Water Pump Installation

- Replace the O-ring [A] with a new one.
- Apply soap and water solution to the new O-ring.
- Install the air bleeder hose [B] and clamp [C] to the water pump body as shown.



Water Pump

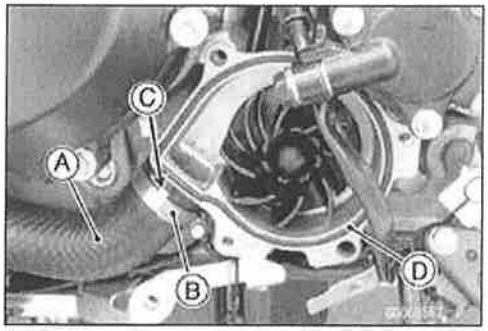
- Turn the water pump shaft so that the slot [A] fits to the projection [B] of the oil pump drive gear shaft.



- Install the water hose [A] and hose clamp [B] as shown. Mark [C]
- Tighten:

Torque - Water Hose Clamp Screw: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Replace the O-ring [D] with a new one.
- Apply soap and water solution to the O-ring.

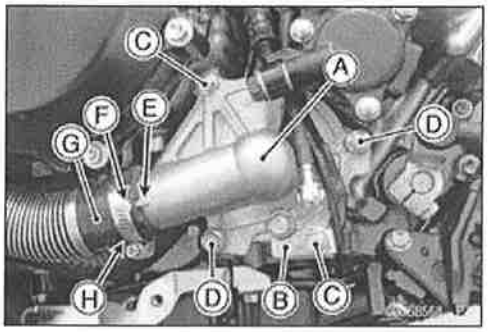


- Install the water pump cover [A] and clamp [B].
- Tighten:

Torque - Water Pump Mounting Bolts [C]: 12 N·m (1.2 kgf·m, 106 in·lb)
Water Pump Cover Bolts [D]: 12 N·m (1.2 kgf·m, 106 in·lb)

- Align the projection [E] of the water pump cover and the mark [F] of the water hose [G].
- Install the water hose clamp [H] as shown.
- Tighten:

Torque - Water Hose Clamp Screw: 3.0 N·m (0.31 kgf·m, 27 in·lb)



- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

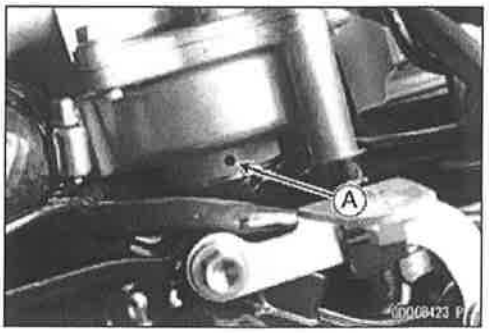
Water Pump Inspection

- Check the drainage outlet passage [A] at the bottom of the water pump body for coolant leaks.
- If a coolant leak or ooze is found, start the engine and check if the coolant leaks continuously.

○When coolant does not continuously leak, it is normal.

★If the mechanical seal is damaged, the coolant continuously leaks through the drainage outlet passage. Replace the mechanical seal unit.

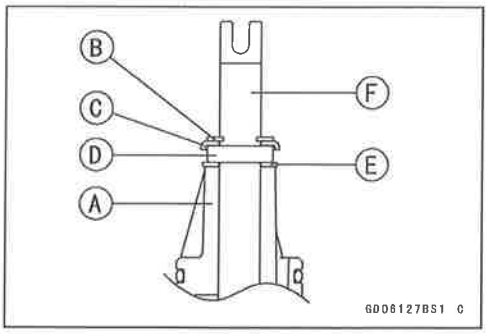
★If the oil seal is damaged, engine oil leaks through the drainage outlet passage. Replace the oil seal.



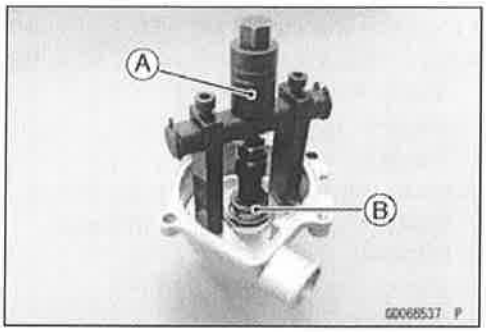
Water Pump

Water Pump Disassembly

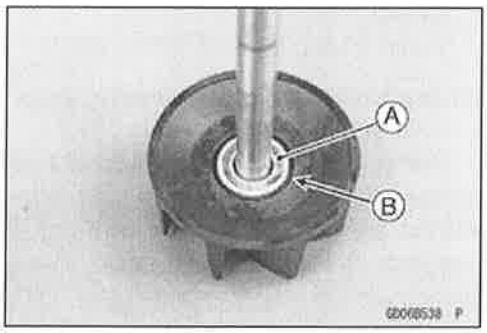
- Remove:
  Water Pump Body [A] (see Water Pump Removal)
  Circlip [B]
  Washer [C]
  Pin [D]
  Washer [E]
  Water Pump Shaft with Impeller [F]



- Using a suitable tool [A], remove the mechanical seal [B] and oil seal from the water pump body.

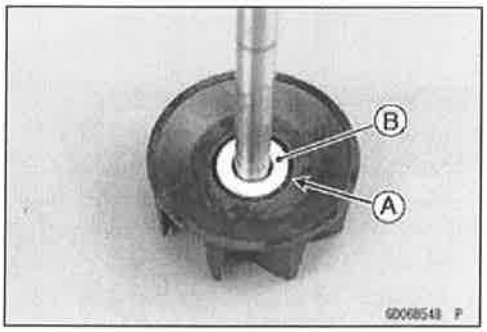


- Remove the sealing seat [A] and rubber seal [B].



Water Pump Assembly

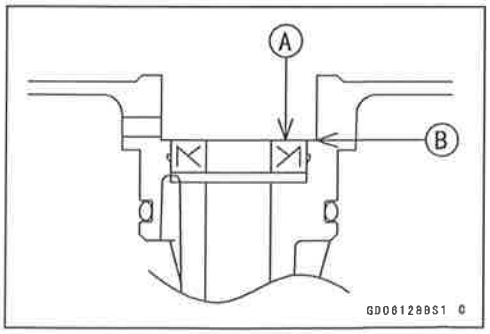
- Apply water or coolant around the surfaces of the rubber seal [A] and sealing seat [B].
- Install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.



NOTICE

Do not reuse the mechanical seal and oil seal.

- Press the new oil seal into the water pump body with a suitable tool so that the surface [A] of the oil seal is flush with the surface [B] of the water pump body.
- Apply grease to the oil seal lips.

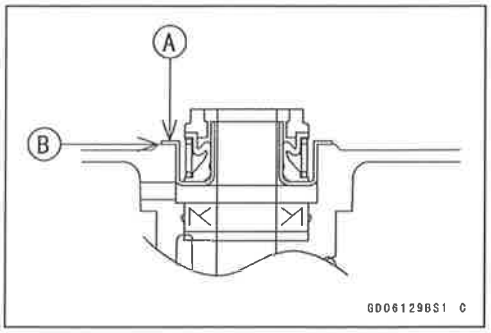


Water Pump

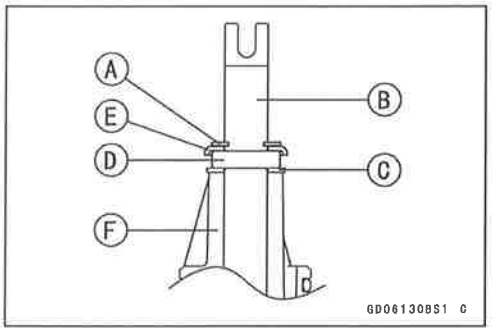
NOTICE

Be careful not to damage the sealing surface of the mechanical seal.

- Press the new mechanical seal into the water pump body with the suitable tool until its flange [A] touches the surface [B] of the water pump body.



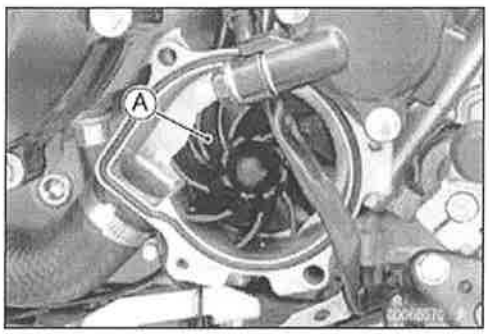
- Replace the circlip [A] with a new one.
- Apply molybdenum disulfide oil to the following parts.
  Water Pump Shaft [B]
  Washer [C]
  Pin [D]
- Install the following parts as shown.
  Water Pump Shaft with Impeller
  Washer
  Pin
  Washer [E]
  Circlip
  Water Pump Body [F] (see Water Pump Installation)



Water Pump Impeller Inspection

- Remove:
  Water Pump Cover (see Water Pump Removal)
- Visually inspect the water pump impeller [A].

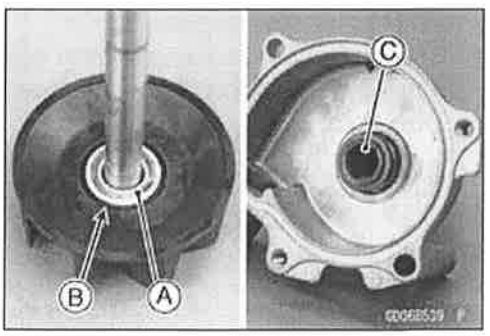
★If the surface is corroded or if the blades are damaged, replace the water pump assy.



Mechanical Seal Inspection

- Remove the water pump shaft with impeller (see Water Pump Disassembly).
- Visually inspect the mechanical seal.

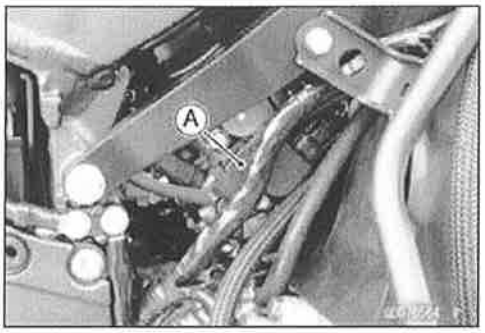
★If any one of the parts is damaged, replace the mechanical seal as a unit.
  Impeller Sealing Seat Surface [A]
  Rubber Seal [B]
  Mechanical Seal [C]



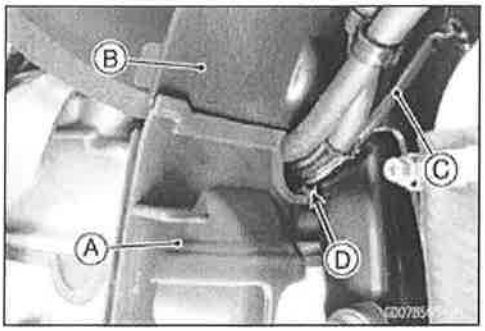
Radiator

Radiator and Radiator Fan Removal

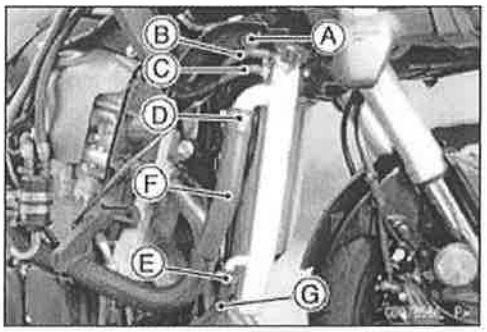
- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Front Middle Fairings (see Front Middle Fairing Removal in the Frame chapter)
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Disconnect the right side radiator fan lead connector [A].



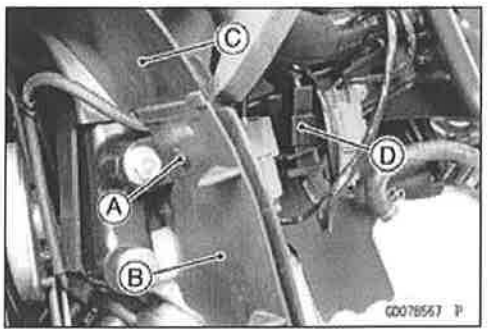
- Remove the right inner rubber cover [A] from the radiator cover [B].
- Clear the right side radiator fan lead [C] from the radiator cover [D].



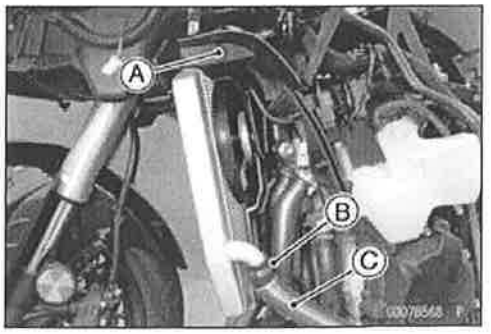
- Remove the damper [A].
- Slide the clamps and disconnect the reserve tank hose [B] and air bleeder hose [C].
- Loosen the clamp screw [D].
- Slide the clamp [E].
- Disconnect:
  Water Hose [F]
  Oil Cooler Outlet Hose [G]



- Remove the quick rivet [A].
- Remove the left inner rubber cover [B] from the radiator cover [C].
- Disconnect the left side radiator fan lead connector [D].

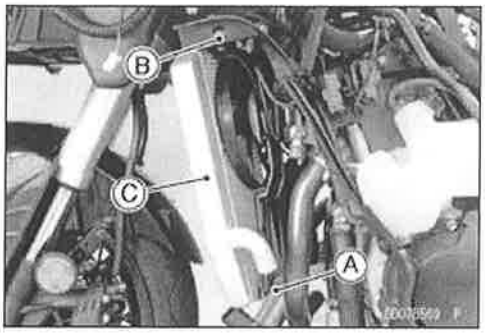


- Remove the damper [A].
- Loosen the clamp screw [B] and disconnect the water hose [C].



Radiator

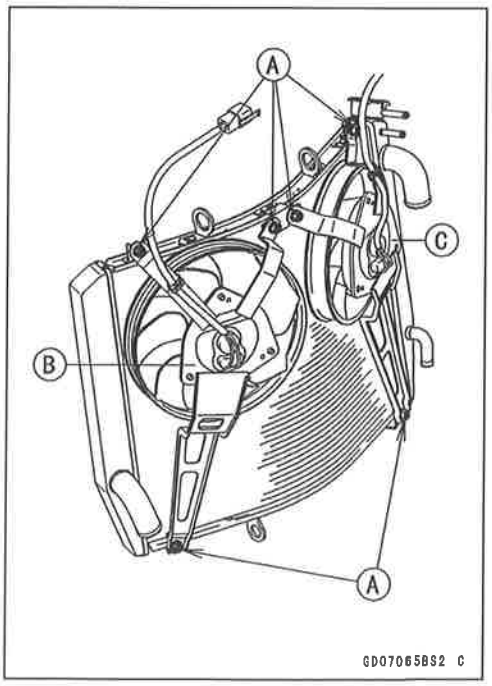
- Remove:
  Radiator Lower Bolt [A]
  Radiator Upper Bolts [B]
  Radiator [C]



NOTICE

Do not touch the radiator core. This could damage the radiator fins, resulting in loss of cooling efficiency.

- Remove:
  Radiator Fan Mounting Bolts [A]
  Left Side Radiator Fan [B]
  Right Side Radiator Fan [C]



Radiator

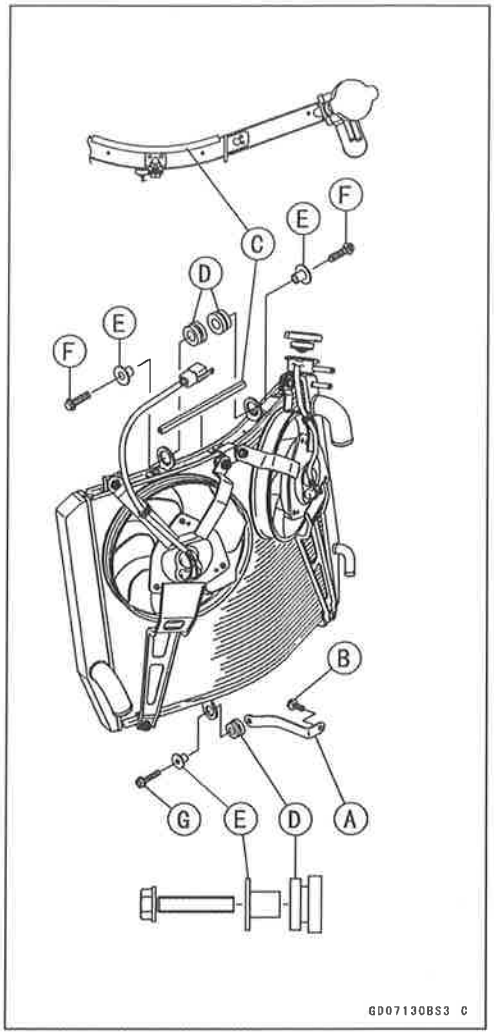
Radiator and Radiator Fan Installation

- Install the radiator stay [A].
- Tighten:

Torque - Radiator Stay Bolt [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Run the radiator fan lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Be sure that the trim seals [C] are in position on the radiator as shown.
- Install the rubber dampers [D] and collars [E] as shown.
- Tighten:

Torque - Radiator Upper Bolts [F]: 25 N·m (2.5 kgf·m, 18 ft·lb)
Radiator Lower Bolt [G]: 9.8 N·m (1.0 kgf·m, 87 in·lb)



- Install the each hose and clamps (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the removed parts (see appropriate chapters).

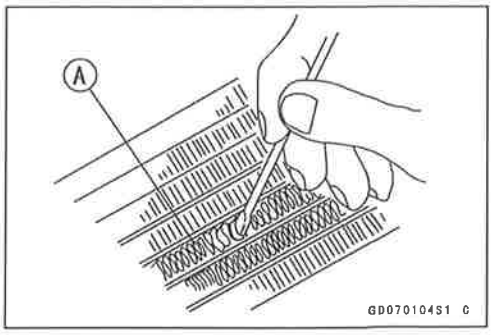
Radiator Inspection

- Remove the radiator (see Radiator and Radiator Fan Removal).
- Check the radiator core.

★If there are obstructions to air flow, remove them.

★If the corrugated fins [A] are deformed, carefully straighten them.

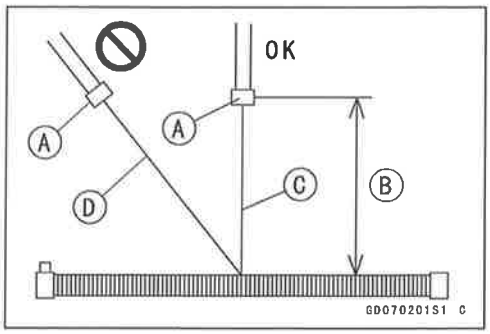
★If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.



Radiator

NOTICE

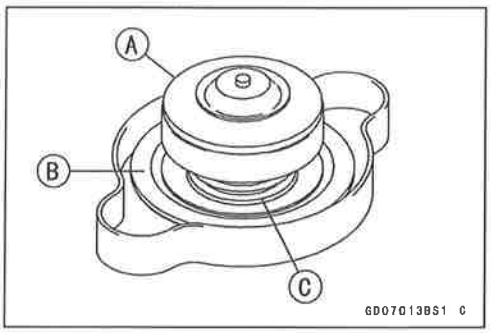
When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage:
Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core.
Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface.
Run the steam gun, following the core fin direction.



Radiator Cap Inspection

- Remove:
  Right Front Middle Fairing (see Front Middle Fairing Removal in the Frame chapter)
  Radiator Cap (see Pressure Testing)
- Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].

★If any one of them shows visible damage, replace the cap with a new one.

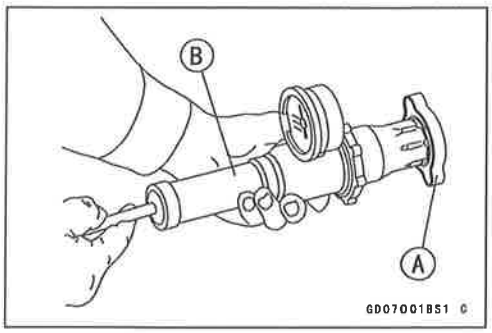


- Install the cap [A] on a cooling system pressure tester [B].

NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*

- Watching the pressure gauge, pump the pressure tester to build up the pressure until the relief valve opens: the gauge needle flicks downward. Stop pumping and measure leak time at once. The relief valve must open within the specified range in the table below and the gauge hand must remain within the same range at least 6 seconds.

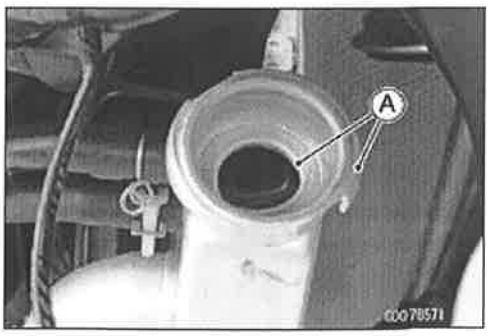


Radiator Cap Relief Pressure
Standard: 93.3 ~ 122.7 kPa (0.95 ~ 1.25 kgf/cm², 13.5 ~ 17.8 psi)

★If the cap can not hold the specified pressure or if it holds too much pressure, replace it with a new one.

Radiator Filler Neck Inspection

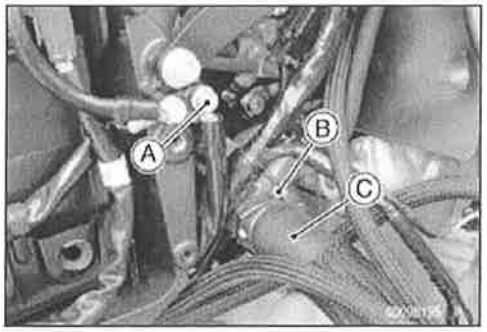
- Remove:
  Right Front Middle Fairing (see Front Middle Fairing Removal in the Frame chapter)
  Radiator Cap (see Pressure Testing)
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.



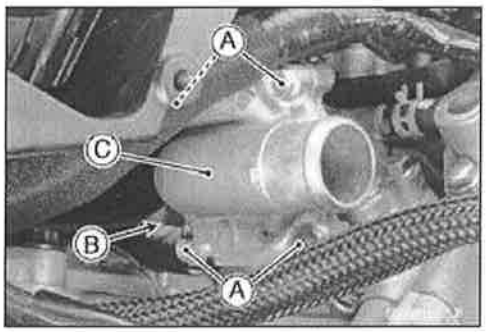
Thermostat

Thermostat Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Right Rear Middle Fairing (see Rear Middle Fairing Removal in the Frame chapter)
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Battery Compartment Cover (see Battery Removal in the Electrical System chapter)
  Ground Bolt [A]
- Loosen the clamp screw [B] and disconnect the water hose [C].

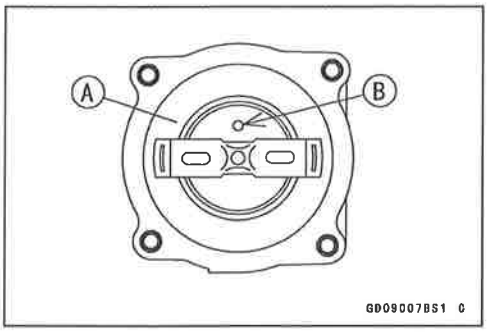


- Remove:
  Thermostat Housing Cover Bolts [A]
  Clamp [B]
  Thermostat Housing Cover [C]
  Thermostat



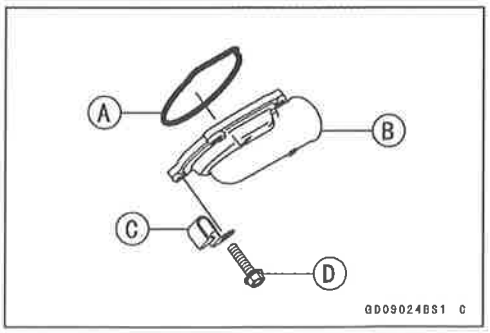
Thermostat Installation

- Install the thermostat [A] in the housing so that the air bleeder hole [B] is on top.



- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Install a new O-ring into the thermostat housing cover [B].
- Install the clamp [C] as shown.
- Tighten:

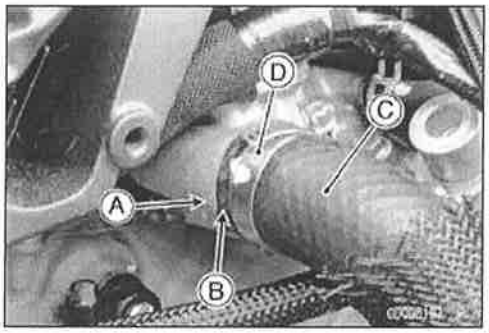
Torque - Thermostat Housing Cover Bolts [D]: 5.9 N·m (0.60 kgf·m, 52 in·lb)



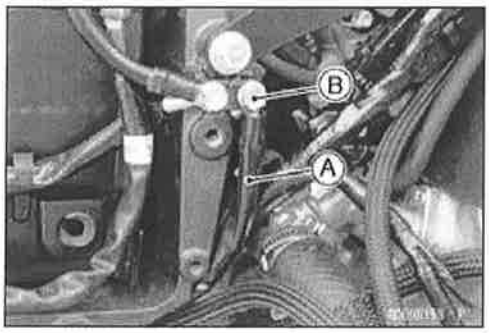
Thermostat

- Align the projection [A] of the thermostat housing cover and the red mark [B] of the water hose [C].
- Install the water hose clamp [D] as shown.
- Tighten:

Torque - Water Hose Clamp Screw: 3.0 N·m (0.31 kgf·m, 27 in·lb)



- Install the cable [A] and tighten the ground bolt [B].

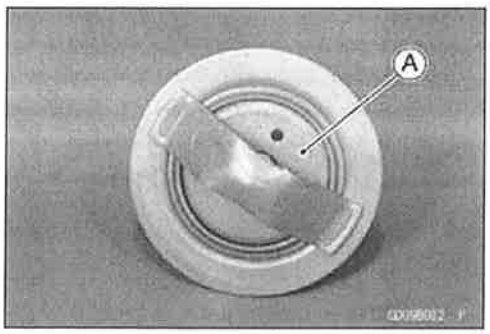


- Install the removed parts (see appropriate chapters).

Thermostat Inspection

- Remove the thermostat (see Thermostat Removal).
- Inspect the thermostat valve [A] at room temperature.

★If the valve is open, replace the thermostat with a new one.

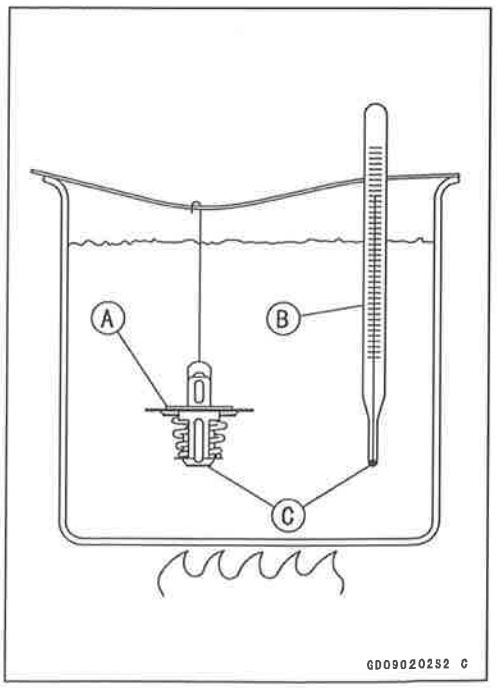


- To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.

○The thermostat must be completely submerged and must not touch the container sides or bottom. Suspend an accurate thermometer [B] in the water so that the heat sensitive portions [C] are located in almost the same depth. It must not touch the container, either.

★If the measurement is out of the specified range, replace the thermostat with a new one.

Thermostat Valve Opening Temperature
Standard: 58 ~ 62°C (136 ~ 144°F)



Hoses and Pipes

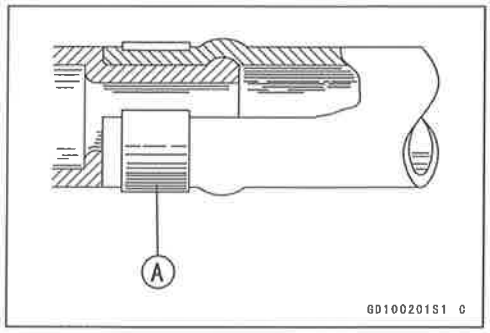
Hose Installation

- Install the hoses and pipes, being careful to follow bending direction. Avoid sharp bending, kinking, flattening or twisting.
- Run the hoses (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the clamp [A] as near as possible to the hose end to clear the raised rib of the fitting. This will prevent the hoses from working loose.

○The clamp screws should be positioned correctly to prevent the clamps from contacting the other parts.

○Tighten:

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)



Hose Inspection

- Refer to the Radiator Hose Inspection in the Periodic Maintenance chapter.

Water Temperature Sensor

Water Temperature Sensor Removal/Installation

- Refer to the Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter.

Water Temperature Sensor Inspection

- Refer to the Water Temperature Sensor Inspection in the Electrical System chapter.

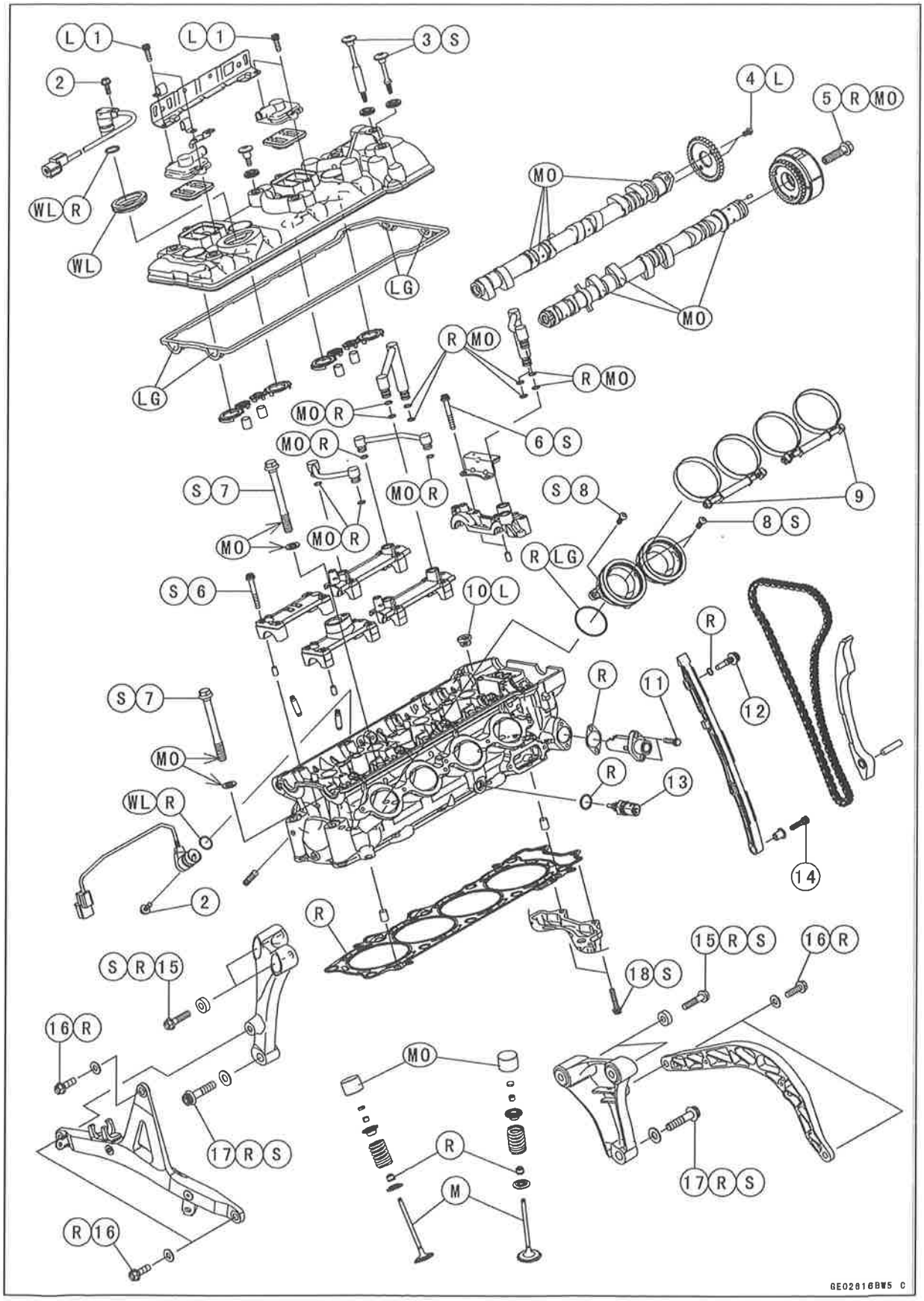
Engine Top End

Table of Contents

Exploded View 5-2
Exhaust System 5-6
Specifications 5-8
Special Tools and Sealants 5-9
Clean Air System 5-11
  Air Suction Valve Removal 5-11
  Air Suction Valve Installation 5-11
  Air Suction Valve Inspection 5-12
  Air Switching Valve Removal 5-12
  Air Switching Valve Installation 5-12
  Air Switching Valve Operation Test 5-12
  Air Switching Valve Unit Test 5-13
  Clean Air System Hose Inspection 5-13
Cylinder Head Cover 5-14
  Cylinder Head Cover Removal 5-14
  Cylinder Head Cover Installation 5-15
Camshaft Chain Tensioner 5-17
  Camshaft Chain Tensioner Removal 5-17
  Camshaft Chain Tensioner Installation 5-17
Camshaft, Camshaft Chain 5-18
  Camshaft Removal 5-18
  Camshaft Installation 5-19
  Camshaft, Camshaft Cap Wear Inspection 5-22
  Camshaft Runout Inspection 5-22
  Cam Wear Inspection 5-22
  Camshaft Chain Removal 5-23
  Camshaft Chain Installation 5-23
Cylinder Head 5-24
  Cylinder Compression Measurement 5-24
  Cylinder Head Removal 5-25
  Cylinder Head Installation 5-26
  Cylinder Head Warp Inspection 5-28
Valves 5-29
  Valve Clearance Inspection 5-29
  Valve Removal 5-29
  Valve Installation 5-29
  Valve Guide Removal 5-29
  Valve Guide Installation 5-29
  Valve-to-Guide Clearance Measurement (Wobble Method) 5-30
  Valve Seat Inspection 5-31
  Valve Seat Repair 5-31
Throttle Body Assy Holder 5-36
  Throttle Body Assy Holder Removal 5-36
  Throttle Body Assy Holder Installation 5-36
Muffler 5-37
  Muffler Body Removal 5-37
  Muffler Body Installation 5-37
  Exhaust Pipe Cover Removal/Installation 5-37
  Exhaust Pipe Removal 5-38
  Exhaust Pipe Installation 5-39

5-2 ENGINE TOP END

Exploded View



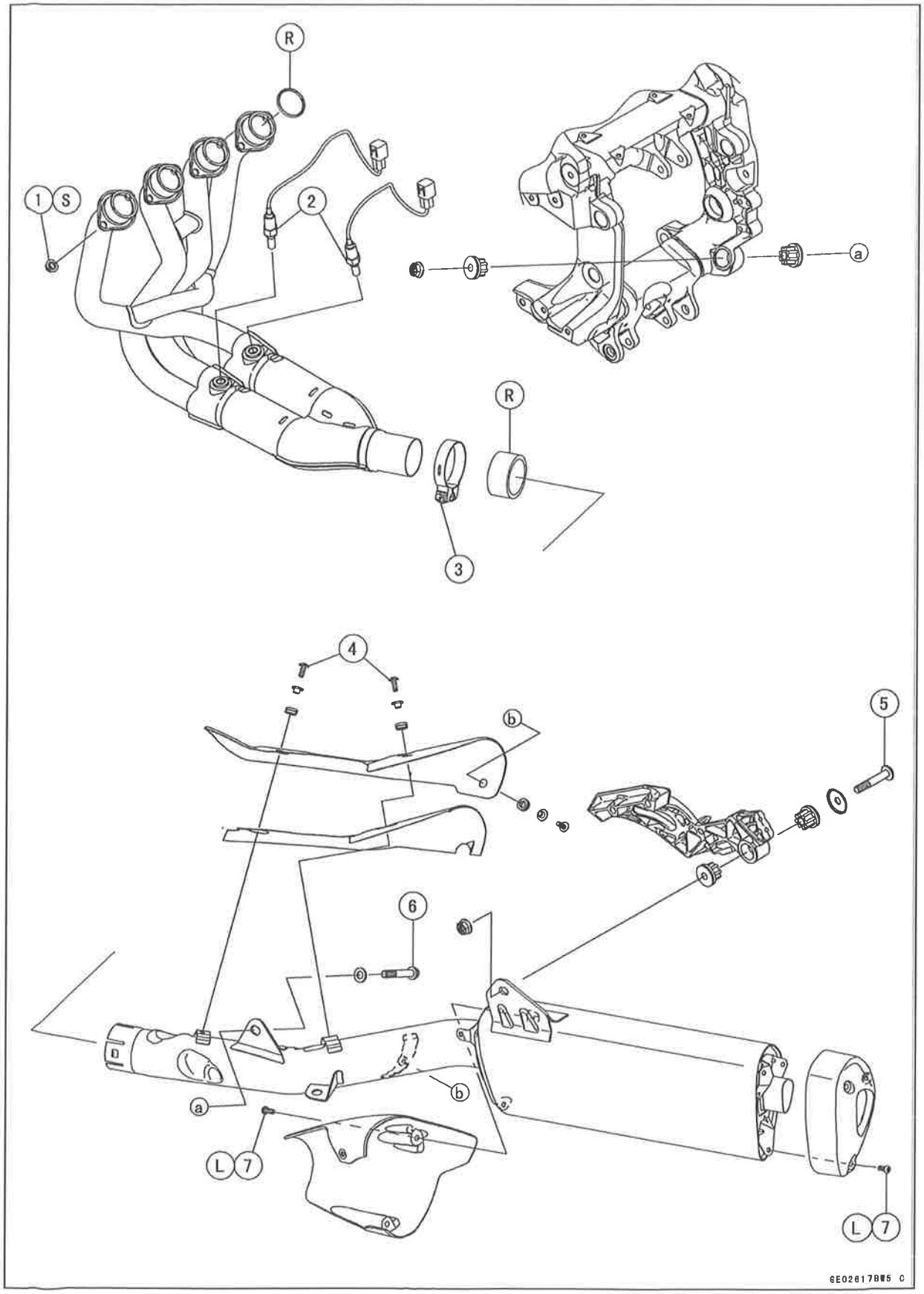
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	L
2	Camshaft Position Sensor Bolts	9.8	1.0	87 in·lb	
3	Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	S
4	Cam Sprocket Mounting Bolts	15	1.5	11	L
5	Variable Valve Actuator Mounting Bolt	59	6.0	44	MO, R
6	Camshaft Cap Bolts	12	1.2	106 in·lb	S
7	Cylinder Head Bolts (M11, First)	39	4.0	29	MO, S
	Cylinder Head Bolts (M11, Final)	72	7.3	53	MO, S
8	Throttle Body Assy Holder Bolts	9.8	1.0	87 in·lb	S
9	Throttle Body Assy Holder Clamp Bolts	2.0	0.20	18 in·lb	
10	Water Passage Plugs	19.6	2.00	14.5	L
11	Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
12	Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
13	Water Temperature Sensor	12	1.2	106 in·lb	
14	Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
15	Engine Bracket Bolts (M8)	25	2.5	18	R, S
16	Subframe Bolts	23	2.3	17	R
17	Front Engine Mounting Bolts (M10)	60	6.1	44	R, S
18	Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S

L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10 : 1)
R: Replacement Parts
S: Follow the specified tightening sequence.
WL: Apply soap and water solution or rubber lubricant.

5-4 ENGINE TOP END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Exhaust Pipe Manifold Holder Nuts	see the text	←	←	S
2	Oxygen Sensors	25	2.5	18	
3	Muffler Body Clamp Bolt	17	1.7	13	
4	Exhaust Pipe Cover Bolts	9.8	1.0	87 in·lb	
5	Muffler Body Mounting Bolt (L = 58 mm)	34	3.5	25	
6	Muffler Body Mounting Bolt (L = 60 mm)	34	3.5	25	
7	Muffler Body Cover Bolts	10	1.0	89 in·lb	L

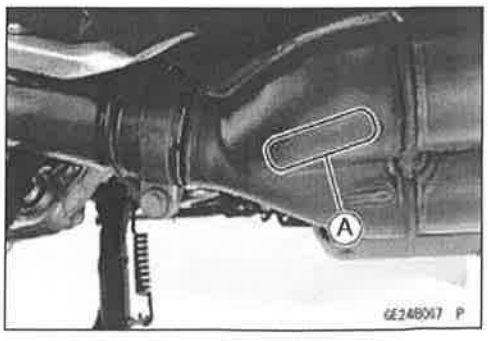
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.

Exhaust System

MANIFOLD	MUFFLER BODY	SPECIFICATION	MODEL
Honeycomb Type Catalyst with Oxygen Sensor P/No. 39178-0224 Mark: KHI M 162	Non-Catalyst P/No. 18091-0943 Mark: KHI K 605 EPA Noise Emission Control Information	AU	ZG1400EF ~ EG Early Model
		WVTA (FULL H)	ZG1400EF ~ EG Early Model
		GB WVTA (FULL H)	ZG1400EF ~ EG Early Model
		WVTA (78.2 H)	ZG1400EF ~ EG Early Model
		SEA-B1	ZG1400EF ~ EG Early Model
		PH	ZG1400EF ~ EG Early Model
		TH	ZG1400EF ~ EG Early Model
		MY	ZG1400EF ~ EG Early Model
		SEA-B2	ZG1400EF ~ EG Early Model
		SEA-B3	ZG1400EF ~ EG Early Model
		CN	ZG1400EF ~ EG Early Model
	Non-Catalyst P/No. 18091-0989 Mark: KHI K 605 EPA Noise Emission Control Information	AU	ZG1400EG Late Model ~ EH
		WVTA (FULL)	ZG1400EG Late Model
		GB WVTA (FULL)	ZG1400EG Late Model
		WVTA (78.2)	ZG1400EG Late Model
		SEA-B1	ZG1400EG Late Model ~ EH
		PH	ZG1400EG Late Model ~ EH
		TH	ZG1400EG Late Model ~ EH
		MY	ZG1400EG Late Model ~ EH
		SEA-B2	ZG1400EG Late Model
		SEA-B3	ZG1400EG Late Model ~ EH
		CN	ZG1400EG Late Model ~ EH
		Euro 3	ZG1400EH
Honeycomb Type Catalyst with Oxygen Sensor P/No. 39178-0236 Mark: KHI M 163	Non-Catalyst P/No. 18091-0943 Mark: KHI K 605 EPA Noise Emission Control Information	CAL	ZG1400EF ~ EG Early Model
		US	ZG1400EF ~ EG Early Model
		CA	ZG1400EF ~ EG Early Model
	Non-Catalyst P/No. 18091-0989 Mark: KHI K 605 EPA Noise Emission Control Information	CAL	ZG1400EG Late Model ~ EH
		US	ZG1400EG Late Model ~ EH
		CA	ZG1400EG Late Model ~ EH

GE24550C F

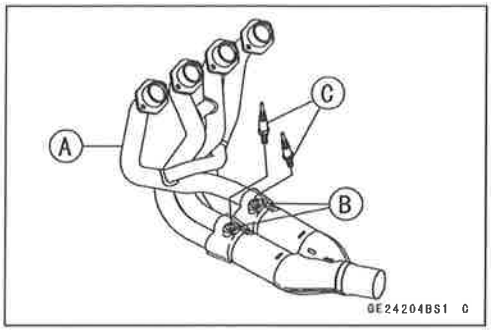
Exhaust Pipe Mark Position [A]



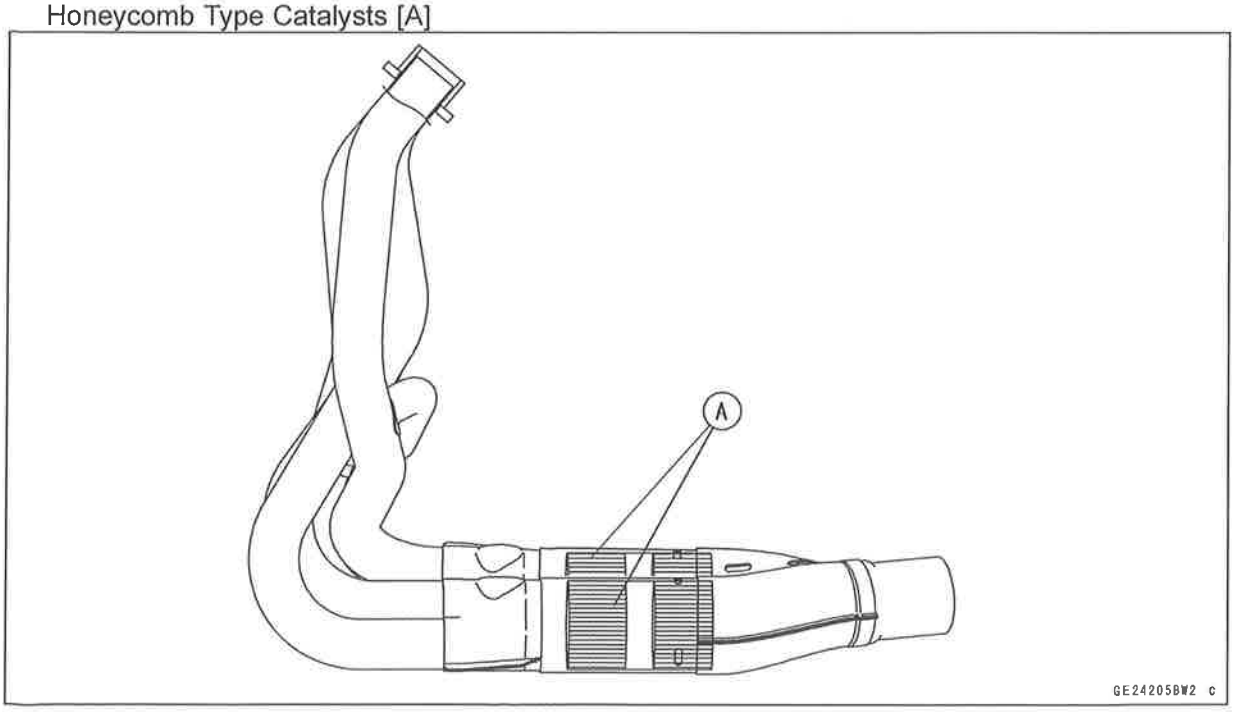
Exhaust System

Muffler Body Mark Position [A]

Exhaust Pipe [A] with Holes [B] for Oxygen Sensors [C]



Honeycomb Type Catalysts [A]

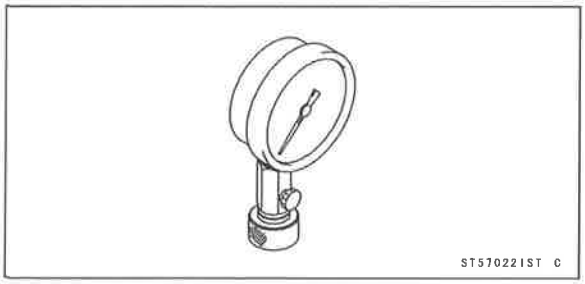


Specifications

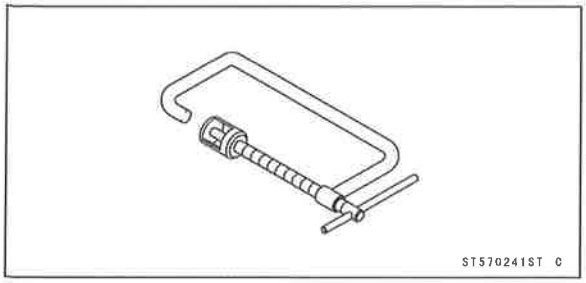
Item	Standard	Service Limit
Camshafts		
Cam Height:		
Exhaust	33.642 ~ 33.756 mm (1.3245 ~ 1.3290 in.)	33.54 mm (1.320 in.)
Intake	34.243 ~ 34.357 mm (1.3481 ~ 1.3526 in.)	34.14 mm (1.344 in.)
Camshaft Journal/Cap Clearance	0.038 ~ 0.081 mm (0.0015 ~ 0.0032 in.)	0.17 mm (0.0067 in.)
Camshaft Journal Diameter	23.940 ~ 23.962 mm (0.94252 ~ 0.94338 in.)	23.91 mm (0.9413 in.)
Camshaft Bearing Inside Diameter	24.000 ~ 24.021 mm (0.94488 ~ 0.94571 in.)	24.08 mm (0.9480 in.)
Camshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.1 mm (0.004 in.)
Cylinder Head		
Cylinder Compression	(Usable Range) 910 ~ 1 398 kPa (9.28 ~ 14.26 kgf/cm², 132 ~ 202.7 psi) @300 r/min (rpm)	– – –
Cylinder Head Warp	– – –	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.19 ~ 0.24 mm (0.0075 ~ 0.0094 in.)	– – –
Intake	0.12 ~ 0.17 mm (0.0047 ~ 0.0067 in.)	– – –
Valve Head Thickness:		
Exhaust	0.80 mm (0.032 in.)	0.7 mm (0.03 in.)
Intake	0.50 mm (0.020 in.)	0.3 mm (0.01 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	4.955 ~ 4.970 mm (0.1951 ~ 0.1957 in.)	4.94 mm (0.194 in.)
Intake	4.975 ~ 4.990 mm (0.1959 ~ 0.1965 in.)	4.96 mm (0.195 in.)
Valve Guide Inside Diameter:		
Exhaust	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in.)	5.08 mm (0.200 in.)
Intake	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in.)	5.08 mm (0.200 in.)
Valve/Valve Guide Clearance (Wobble Method):		
Exhaust	0.09 ~ 0.18 mm (0.0035 ~ 0.0071 in.)	0.39 mm (0.015 in.)
Intake	0.03 ~ 0.12 mm (0.0012 ~ 0.0047 in.)	0.33 mm (0.013 in.)
Valve Seat Cutting Angle	45°, 32°, 60°	– – –
Valve Seating Surface:		
Outside Diameter:		
Exhaust	27.6 ~ 27.8 mm (1.09 ~ 1.09 in.)	– – –
Intake	32.6 ~ 32.8 mm (1.28 ~ 1.29 in.)	– – –
Width:		
Exhaust	0.8 ~ 1.2 mm (0.032 ~ 0.047 in.)	– – –
Intake	0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)	– – –
Valve Spring Free Length:		
Exhaust	38.7 mm (1.52 in.)	37.1 mm (1.46 in.)
Intake	38.7 mm (1.52 in.)	37.1 mm (1.46 in.)

Special Tools and Sealants

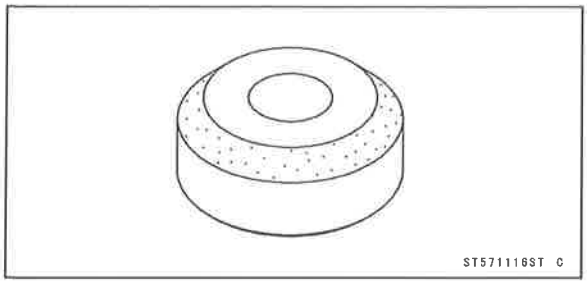
Compression Gauge, 20 kgf/cm²:
57001-221



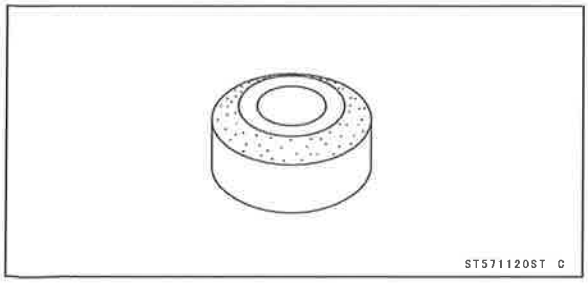
Valve Spring Compressor Assembly:
57001-241



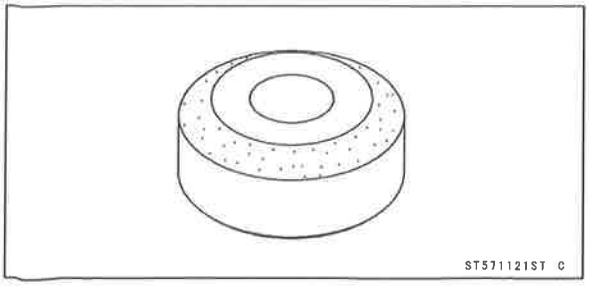
Valve Seat Cutter, 45° - ϕ35:
57001-1116



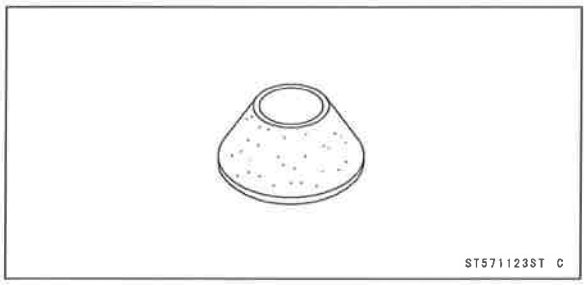
Valve Seat Cutter, 32° - ϕ30:
57001-1120



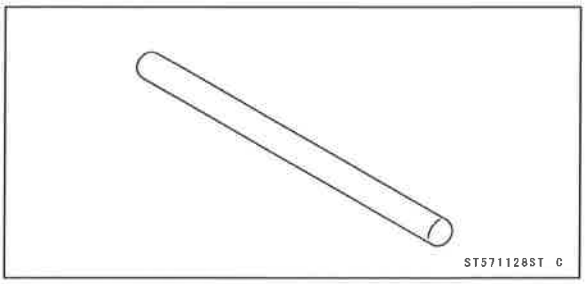
Valve Seat Cutter, 32° - ϕ35:
57001-1121



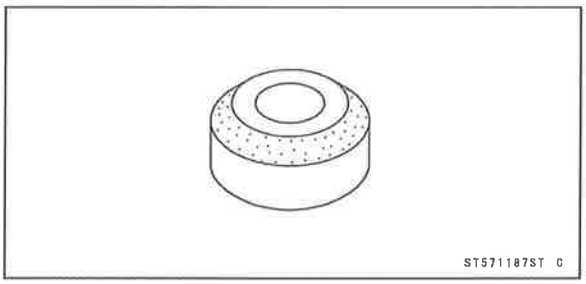
Valve Seat Cutter, 60° - ϕ30:
57001-1123



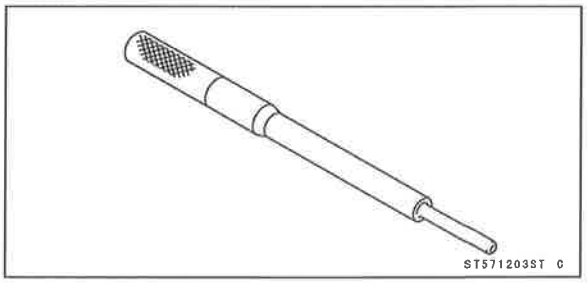
Valve Seat Cutter Holder Bar:
57001-1128



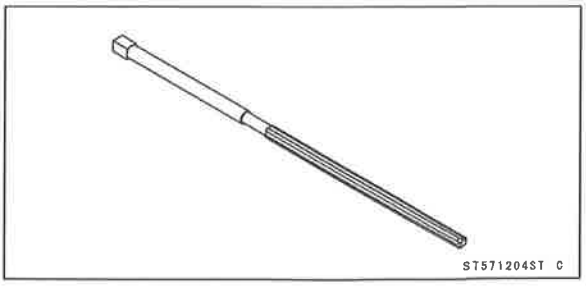
Valve Seat Cutter, 45° - ϕ30:
57001-1187



Valve Guide Arbor, ϕ5:
57001-1203

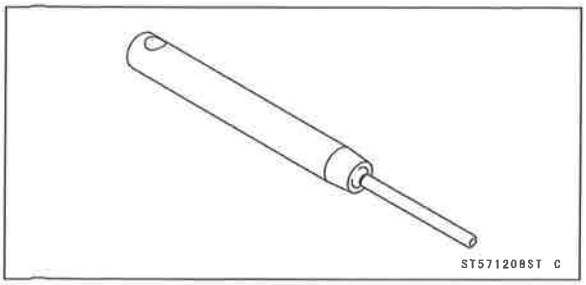


Valve Guide Reamer, ϕ5:
57001-1204

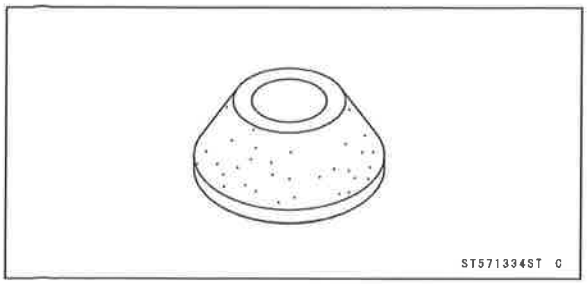


Special Tools and Sealants

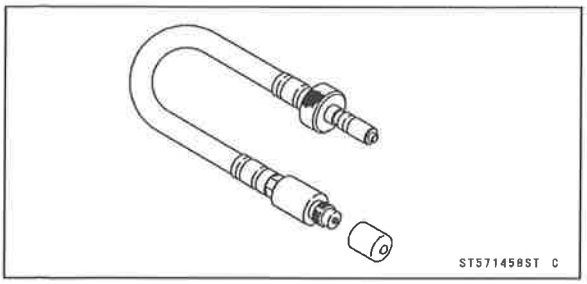
Valve Seat Cutter Holder, ϕ5:
57001-1208



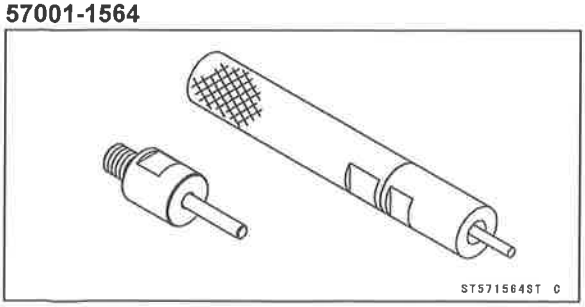
Valve Seat Cutter, 60° - ϕ33:
57001-1334



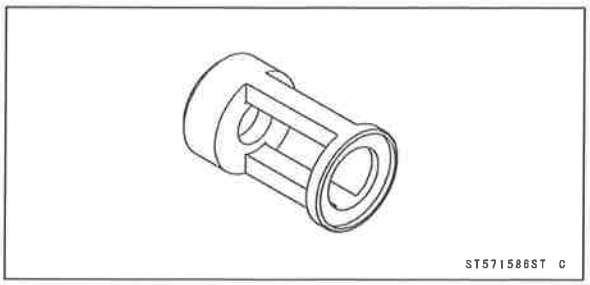
Compression Gauge Adapter, M10 × 1.0:
57001-1458



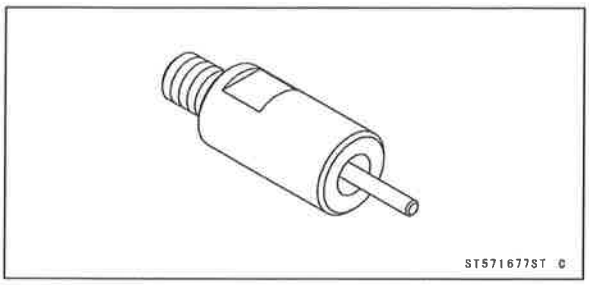
Valve Guide Driver:
57001-1564



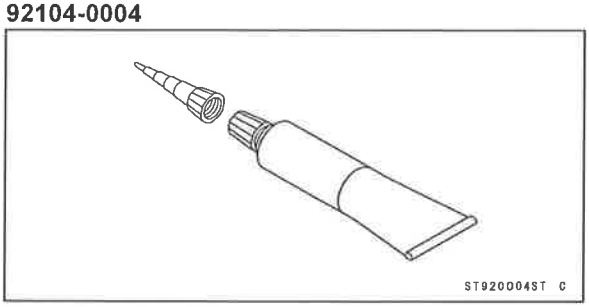
Valve Spring Compressor Adapter, ϕ24:
57001-1586



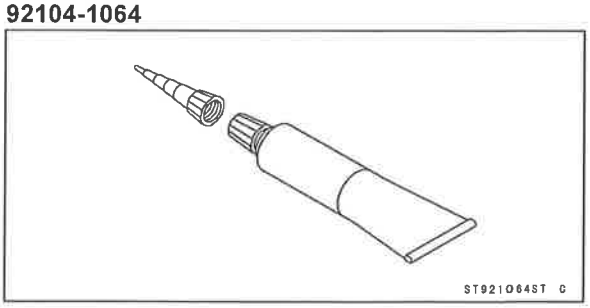
Valve Guide Driver Attachment, E:
57001-1677



Liquid Gasket, TB1211F:
92104-0004

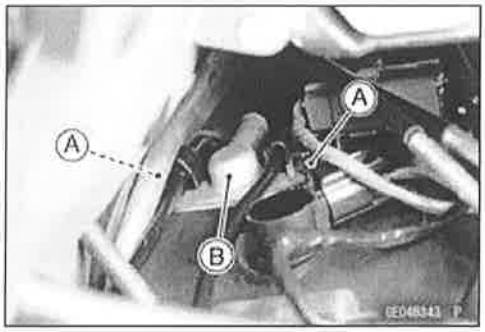


Liquid Gasket, TB1216B:
92104-1064

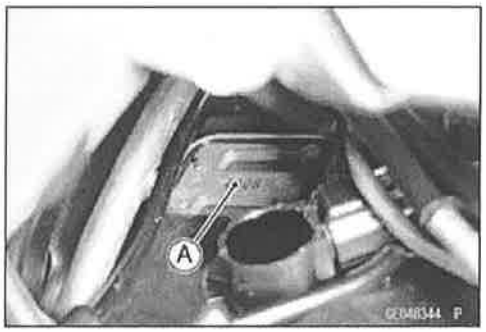


Clean Air System

Air Suction Valve Removal



- Remove:
  Front Middle Fairings (see Front Middle Fairing Removal in the Frame chapter)
  Subframes (see Left/Right Subframe Removal in the Frame chapter)
- Remove the air switching valve with the hoses (see Air Switching Valve Removal).
- Remove:
  Air Suction Valve Cover Bolts [A]
  Air Suction Valve Cover [B]



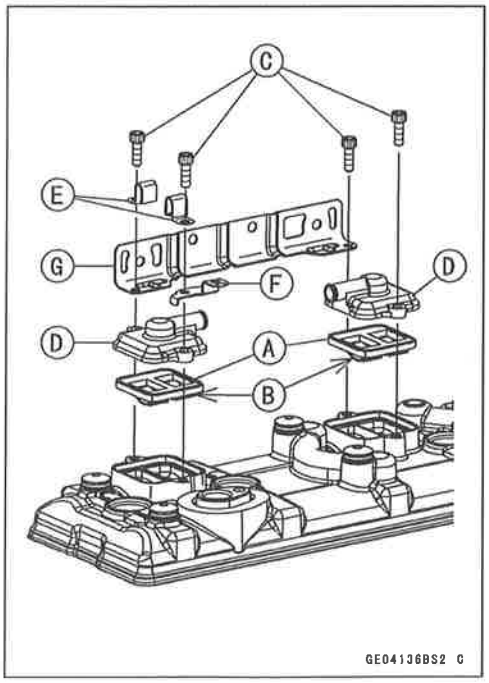
- Remove:
  Air Suction Valve [A]

Air Suction Valve Installation

- Install the air suction valves [A] so that opening [B] of the reed faces the rear and downward.
- Apply a non-permanent locking agent to the threads of the air suction valve cover bolts [C].
- Install:
  Air Suction Valve Covers [D]
  Clamps [E] (for camshaft position sensor leads)
  Plate [F] (for subharness connector of stick coils)
  Heat Insulation Plate Bracket [G]
- Tighten:

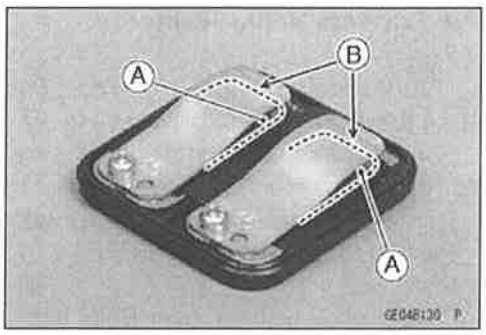
  Torque - Air Suction Valve Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).



Clean Air System

Air Suction Valve Inspection



- Remove the air suction valve (see Air Suction Valve Removal).
- Visually inspect the reeds [A] for cracks, folds, warps, heat damage, or other damage.

★ If there is any doubt as to the condition of the reed, replace the air suction valve as an assembly.

- Check the reed contact areas [B] of the valve holder for grooves, scratches, any sings of separation from the holder, or heat damage.

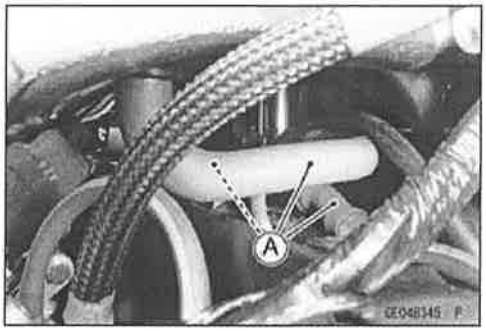
★ If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.

★ If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly with a high flash-point solvent.

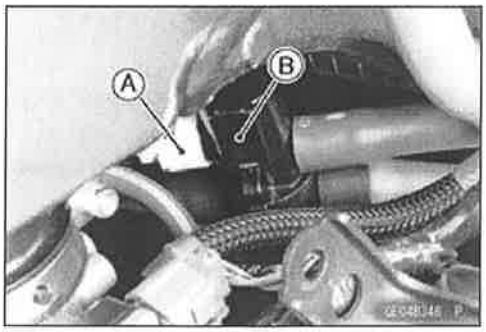
NOTICE

Do not scrape off the deposits with a scraper as this could damage the rubber, requiring replacement of the suction valve assembly.

Air Switching Valve Removal



- Remove:
  Right Front Middle Fairing (see Front Middle Fairing Removal in the Frame chapter)
  Right Subframe (see Right Subframe Removal in the Frame chapter)
- Disconnect the hoses [A]

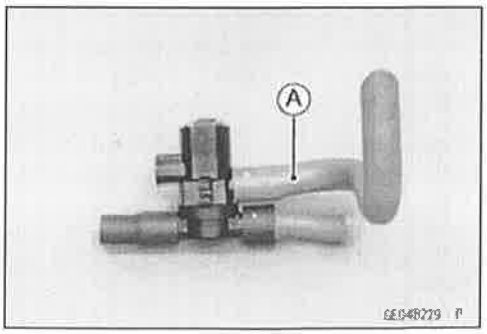


- Disconnect the connector [A].
- Remove the air switching valve [B] with the hoses.

NOTICE

Never drop the switch especially on a hard surface. Such a shock to the switch can damage it.

Air Switching Valve Installation



- Install the air switching valve so that the hose [A] faces right side.
- Route the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Air Switching Valve Operation Test

- Refer to the Air Switching Valve Operation Test in the Electrical System chapter.

Clean Air System

Air Switching Valve Unit Test

- Refer to the Air Switching Valve Unit Test in the Electrical System chapter.

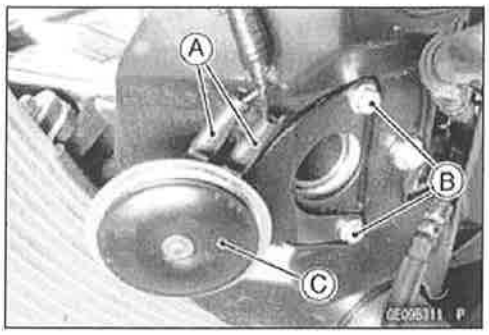
Clean Air System Hose Inspection

- Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, air switching valve and air suction valve covers.

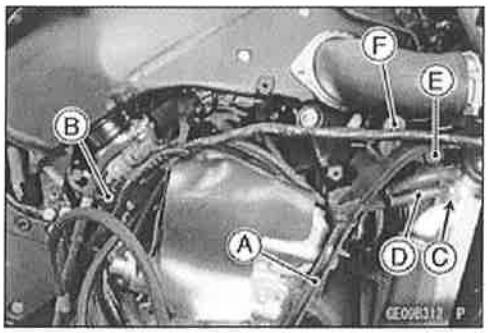
★If they are not, correct them. Replace them if they are damaged.

Cylinder Head Cover

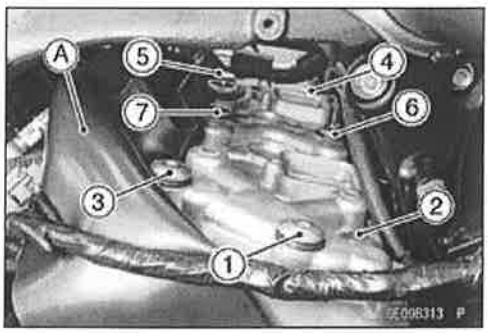
Cylinder Head Cover Removal



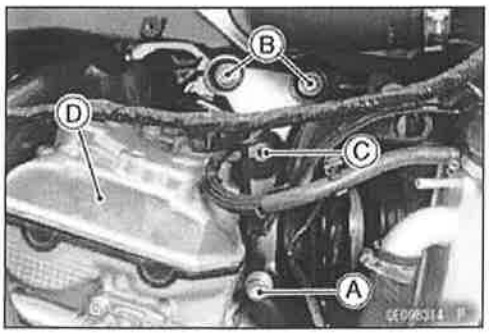
- Remove:
  Front Middle Fairings (see Front Middle Fairing Removal in the Frame chapter)
  Fairing Stays (see Left/Right Fairing Stay Removal in the Frame chapter)
  Subframes (see Left/Right Subframe Removal in the Frame chapter)
  Air Suction Valve (see Air Suction Valve Removal)
  Stick Coils (see Stick Coil Removal in the Electrical System chapter)
  Intake Camshaft Position Sensor (see Camshaft Position Sensor Removal in the Electrical System chapter)
- Disconnect the horn connectors [A].
- Remove:
  Horn Mounting Bolts [B]
  Horn [C]



- Remove the right inner rubber cover [A] from the radiator cover.
- Disconnect the right side radiator fan lead connector [B].
- Slide the clamp [C] and disconnect the water hose [D].
- Remove the plug [E] and radiator bolt [F] on both sides.
- Move the radiator and radiator cover forward.



- Move the heat insulation rubber plate [A] backward.
- Loosen the cylinder head cover bolts as shown sequence [1 ~ 7], and remove them.

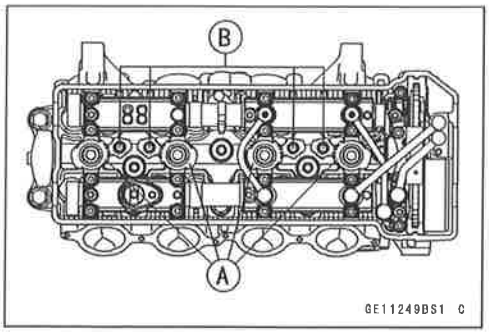


- Remove:
  Right Front Engine Mounting Bolt [A]
  Right Engine Bracket Bolts [B]
  Right Engine Bracket [C]
- Remove the cylinder head cover [D] to the right side of the engine.

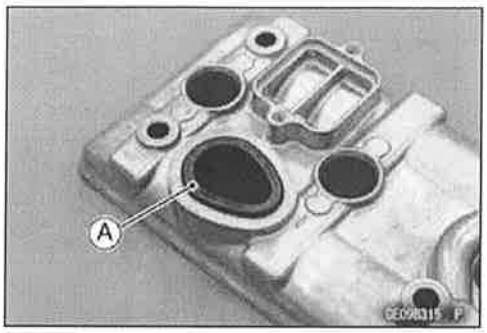
Cylinder Head Cover

Cylinder Head Cover Installation

- Replace the plug hole gaskets with new ones.
- Install:
  Dowel Pins [B]
  Plug Hole Gaskets [A]

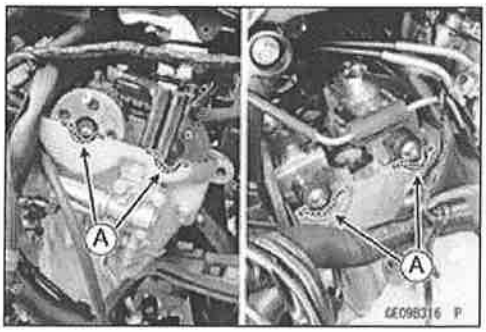


- Check that the grommet [A] is in place the cylinder head cover.



- Replace the head cover gasket with a new one.
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to the cylinder head as shown.

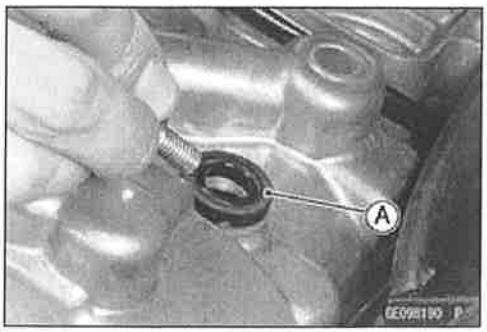
Sealant - Liquid Gasket, TB1216B: 92104-1064



NOTE

○*Make the application finish within 20 minutes when the liquid gasket (TB1216B) to the mating surface of the cylinder head cover is applied.*

- Install the cylinder head cover.
- Install the washers [A] with the metal side face upward.

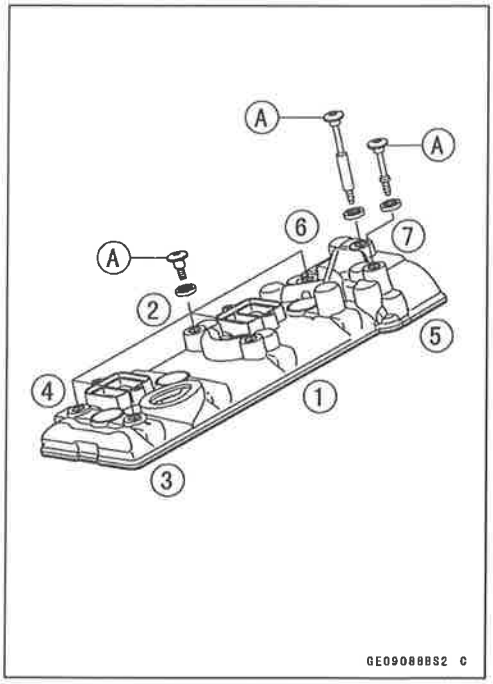


Cylinder Head Cover

- Tighten the cover bolt [A], following the specified tightening sequence [1 ~ 7].

  Torque - Cylinder Head Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).

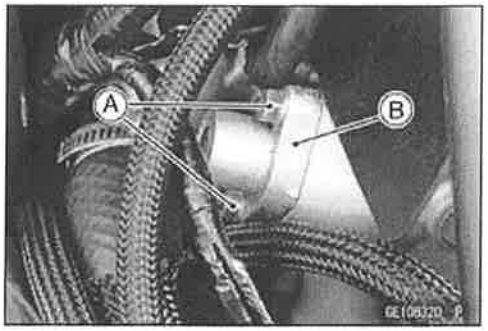


Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

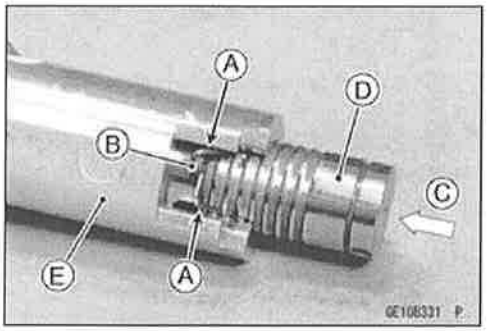
NOTICE
Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.

- Remove the right rear middle fairing (see Rear Middle Fairing Removal in the Frame chapter).
- Remove the camshaft chain tensioner mounting bolts [A] and take off the camshaft chain tensioner [B].

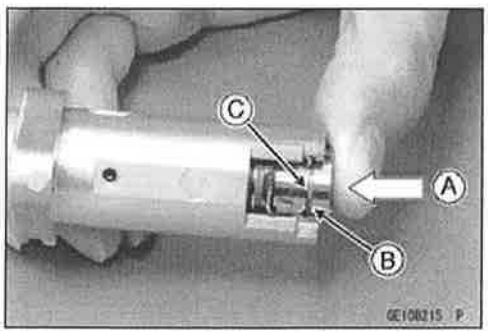


Camshaft Chain Tensioner Installation

- Pinching [A] the stopper [B], release it and push [C] the push rod [D] into the interior of the tensioner body [E].



- Pushing [A] the push rod, slide the snap ring [B] into the outside groove [C] from the ranged groove.



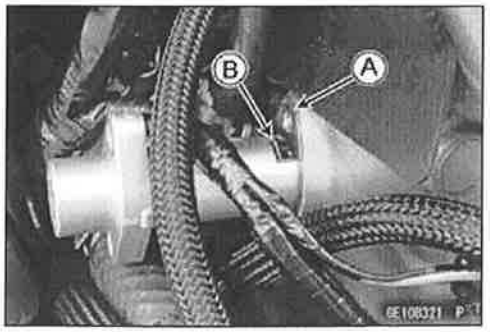
- Replace the gasket [A] with a new one.
- Install the tensioner body so that the stopper [B] faces upward.
- Tighten:

Torque - Camshaft Chain Tensioner Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Turn the crankshaft 2 turns clockwise to allow the tensioner to expand and recheck the camshaft chain timing.

NOTE

○*You hear of the sound from which the push rod moves out.*

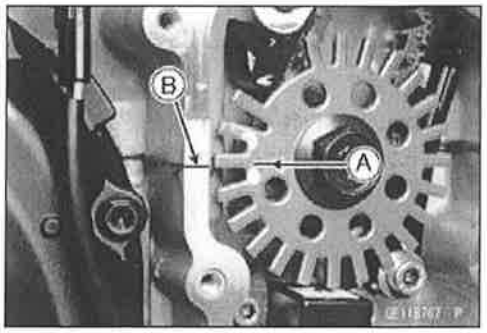


- Install the removed parts (see appropriate chapters).

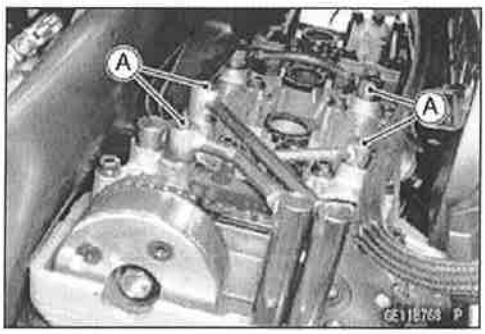
Camshaft, Camshaft Chain

Camshaft Removal

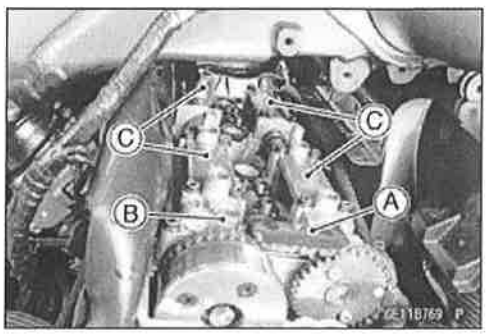
- Remove:
  Cylinder Head Cover (see Cylinder Head Cover Removal)
  Timing Rotor Cover (see Crankshaft Sensor Removal in the Electrical System chapter)
- Align the #1, 4 T mark [A] on the timing rotor with the mating surface [B] of the crankcase halves to position the crankshaft to the #1, 4 piston TDC.

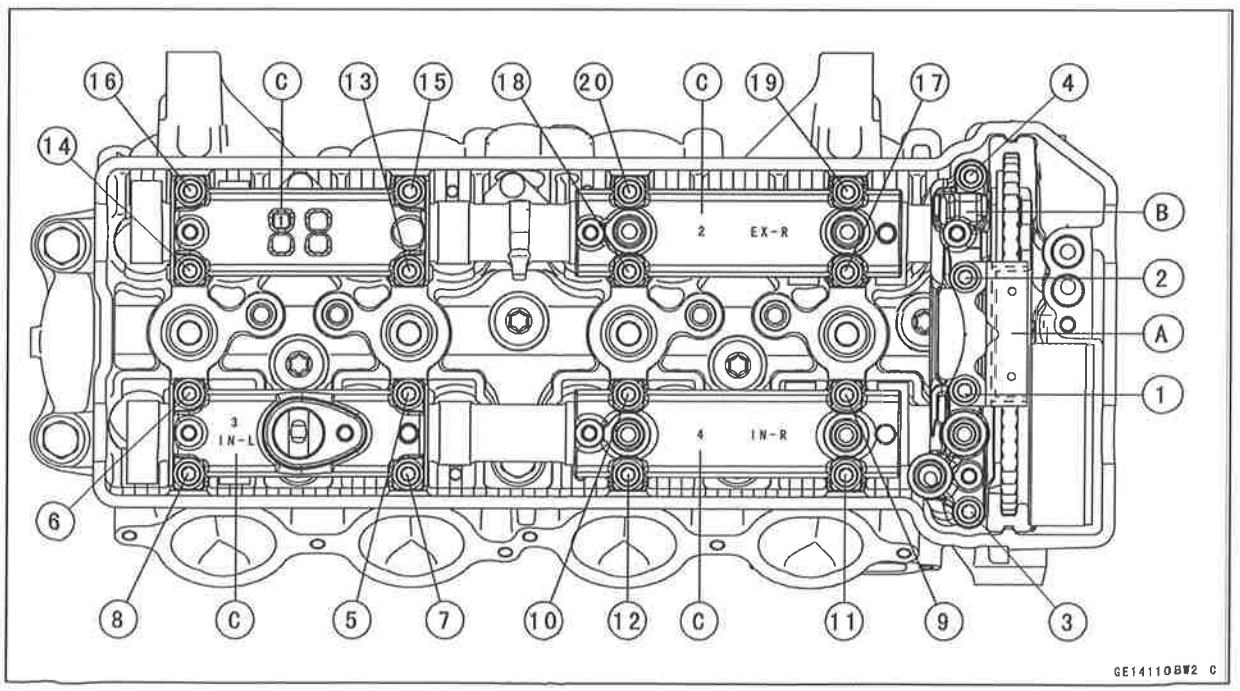


- Remove:
  Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
  Oil Pipes [A]



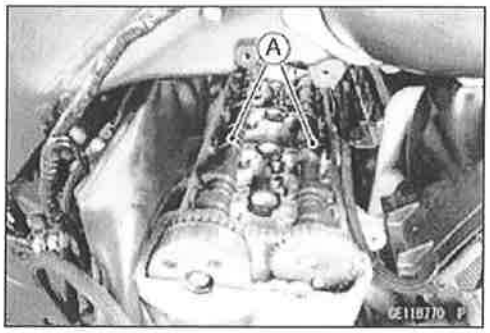
- Loosen the camshaft cap bolts gradually and evenly as shown sequence [1 ~ 20], and remove them.
- First remove the chain guide [A], next remove the camshaft cap [B], the remove all camshaft caps [C]



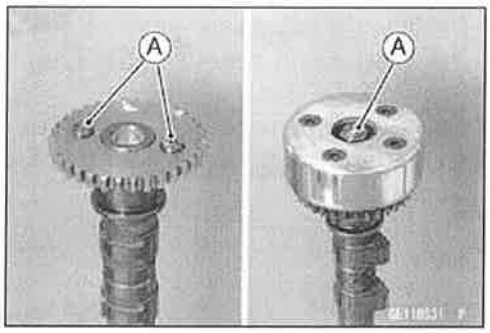


Camshaft, Camshaft Chain

- Remove the camshafts [A].
- Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.



- Remove the variable valve actuator and cam sprocket mounting bolts [A].
- Remove the variable valve actuator and cam sprocket.



NOTICE

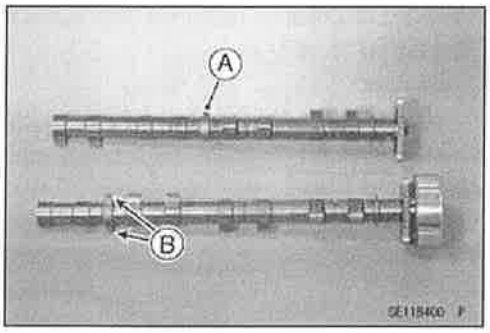
The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

Camshaft Installation

NOTE

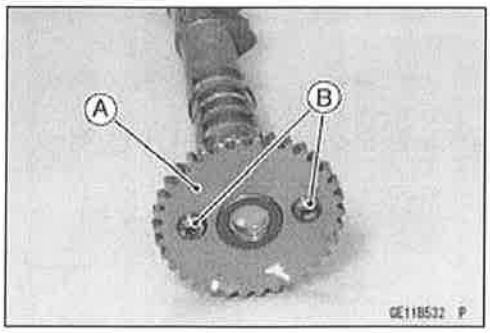
○The exhaust camshaft has the projection [A] for camshaft position sensor.

○The intake camshaft has two projections [B] for camshaft position sensor.



- Install the exhaust cam sprocket [A] so that the flat surface faces outside.
- Apply a non-permanent locking agent to the threads of the cam sprocket mounting bolts [B].
- Tighten:

Torque - Cam Sprocket Mounting Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)

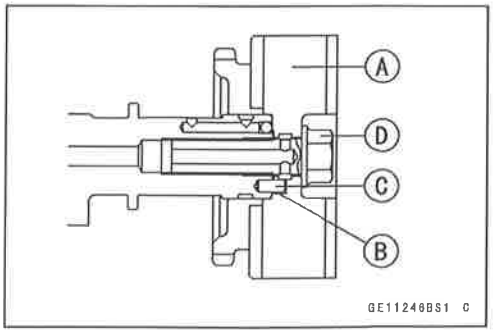


- Install the variable valve actuator [A].

○Put the follow [B] of the actuator on the pin [C] of the camshaft.

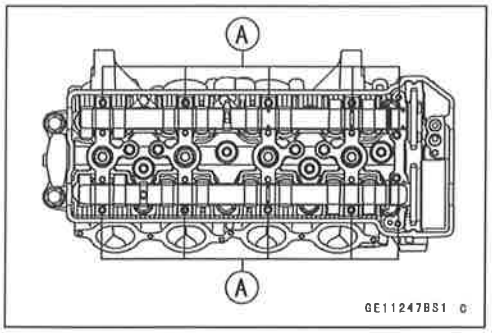
- Replace the variable valve actuator mounting bolt [D] with a new one.
- Apply molybdenum disulfide oil to seating surface.
- Tighten:

Torque - Variable Valve Actuator Mounting Bolt: 59 N·m (6.0 kgf·m, 44 ft·lb)



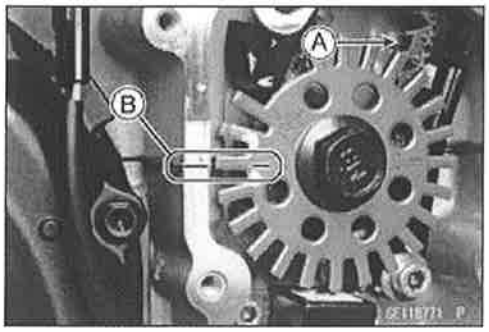
Camshaft, Camshaft Chain

- Be sure to install the dowel pins [A].
- Apply molybdenum disulfide oil to the cam surfaces and all journal portions.

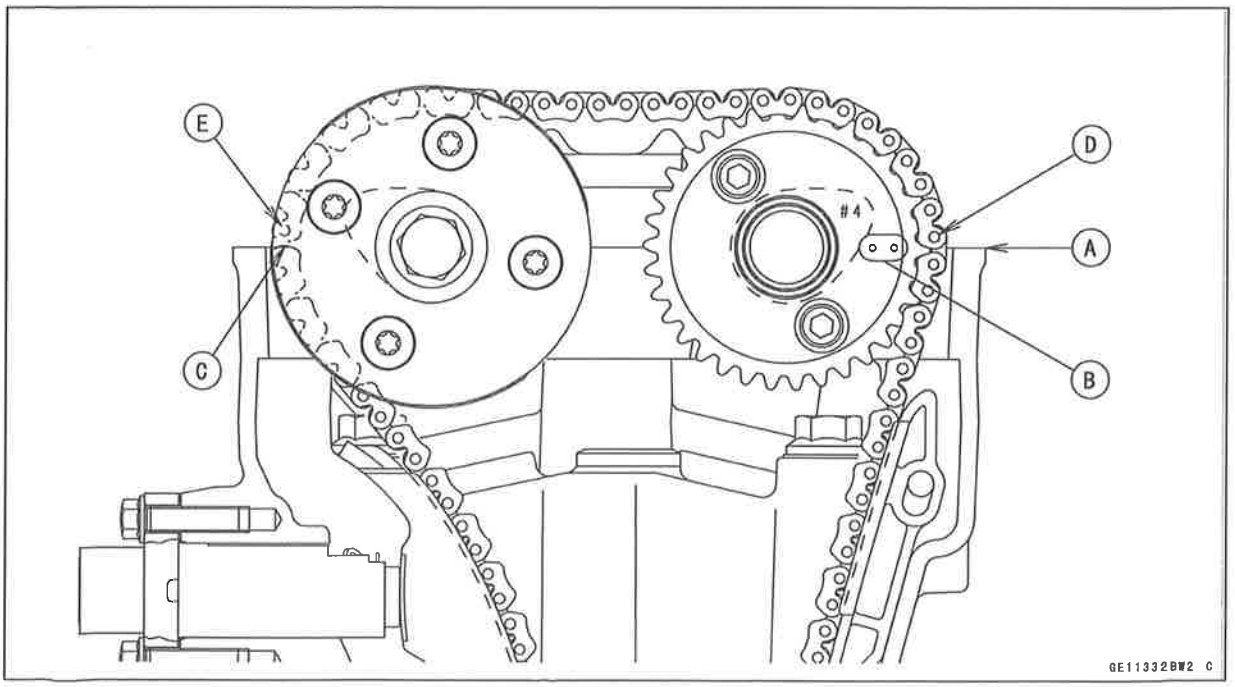


- Position the crankshaft at #1, 4 piston TDC.
- Pull the tension side (exhaust side) [A] of the chain taut to install the chain.
- Engage the camshaft chain with the camshaft sprockets so that the timing marks on the sprockets are positioned as shown.

○The timing marks of #1, 4T must be aligned with the lower surface of crankcase of rear side [B].



○The timing marks must be aligned with the cylinder head upper surface [A].
EX Mark [B]
IN Mark [C]
No.1 Pin [D]
No.30 Pin [E]



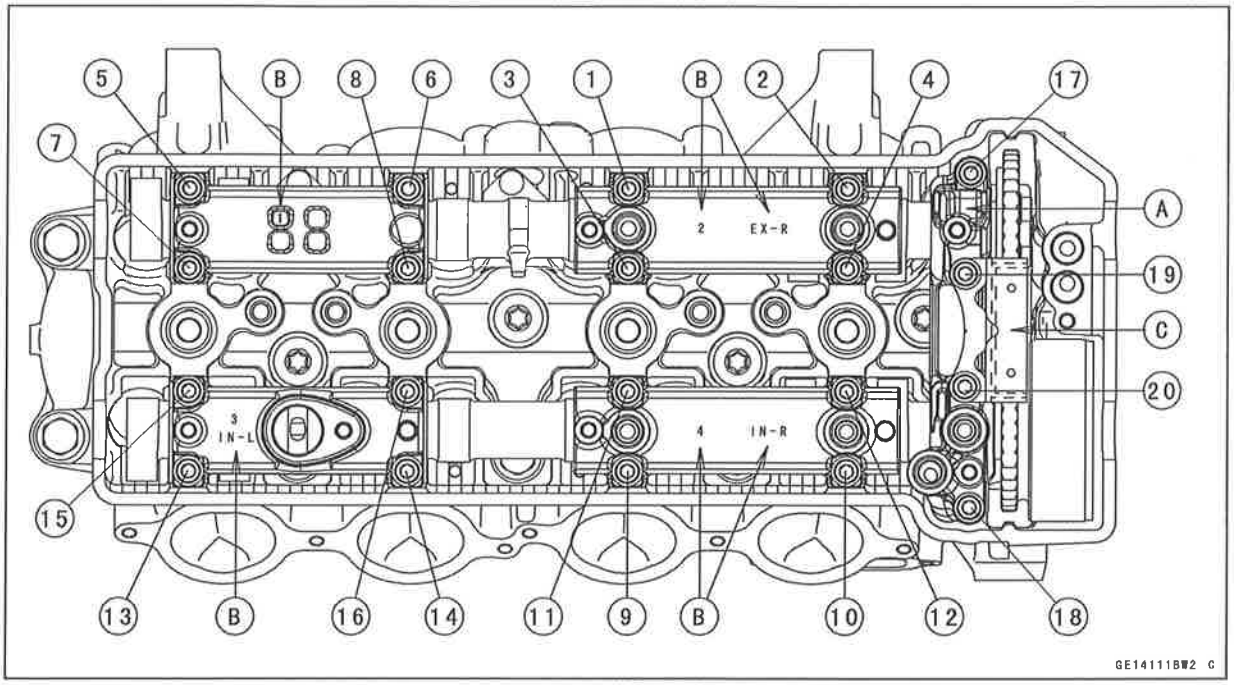
Camshaft, Camshaft Chain

- First install the camshaft cap [A] temporary to fix the position of the camshaft.
- Next install the camshaft caps, following the identification No. and/or Name [B] and chain guide [C].

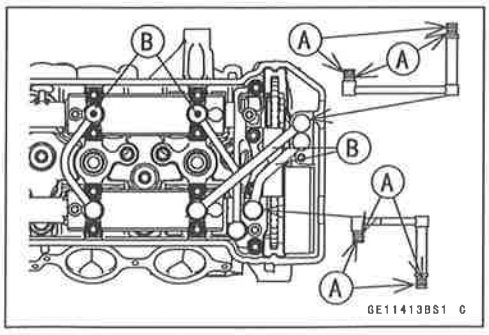
○Install the camshaft chain tensioner temporary (see Camshaft Chain Tensioner Installation).

○Temporary tighten the camshaft cap bolts following the specified tightening sequence [1 ~ 20] to seat the camshaft in place. Then tighten all bolts following the specified tightening sequence [1 ~ 20].

Torque - Camshaft Cap Bolts (1 ~ 20): 12 N·m (1.2 kgf·m, 106 in·lb)

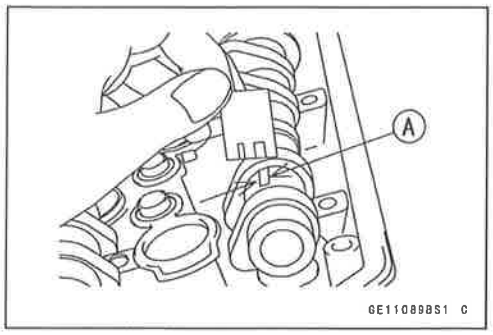


- Apply molybdenum disulfide oil solution to the new O-rings [A].
- Install the two O-rings to the oil pipes [B].
- Install the oil pipes as shown.
- Install the removed parts (see appropriate chapters).



Camshaft, Camshaft Chain

Camshaft, Camshaft Cap Wear Inspection



- Remove the camshaft caps (see Camshaft Removal).
- Cut the strips of plastigage (press gauge) to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Tighten the camshaft cap bolts and upper camshaft chain guide bolts to the specified torque (see Camshaft Installation).

NOTE

○*Do not turn the camshaft when the plastigage is between the journal and camshaft cap.*

- Remove the camshaft cap again, measure each clearance between the camshaft journal and the camshaft cap using plastigage [A].

Camshaft Journal/Camshaft Cap Clearance

Standard: **0.038 ~ 0.081 mm (0.0015 ~ 0.0032 in.)**

Service Limit: **0.17 mm (0.0067 in.)**

★If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

Camshaft Journal Diameter

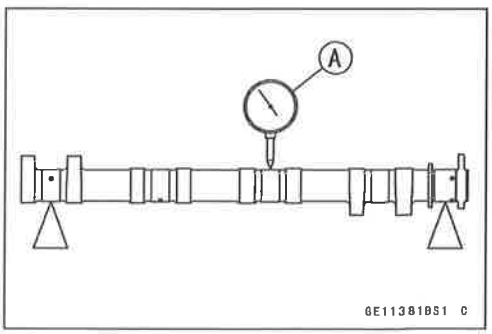
Standard: **23.940 ~ 23.962 mm (0.94252 ~ 0.94338 in.)**

Service Limit: **23.91 mm (0.9413 in.)**

★If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.

★If the clearance still remains out of the service limit, replace the cylinder head unit.

Camshaft Runout Inspection



- Remove the camshaft (see Camshaft Removal).
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure runout with a dial gauge [A] at the specified place as shown.

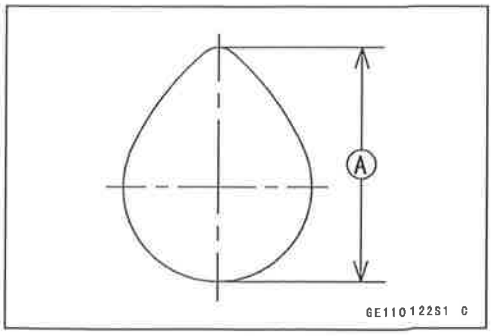
★If the runout exceeds the service limit, replace the shaft.

Camshaft Runout

Standard: **TIR 0.02 mm (0.0008 in.) or less**

Service Limit: **TIR 0.1 mm (0.004 in.)**

Cam Wear Inspection



- Remove the camshaft (see Camshaft Removal).
- Measure the height [A] of each cam with a micrometer.

★If the cams are worn down past the service limit, replace the camshaft.

Cam Height

Standard:

Exhaust **33.642 ~ 33.756 mm (1.3245 ~ 1.3290 in.)**

Intake **34.243 ~ 34.357 mm (1.3481 ~ 1.3526 in.)**

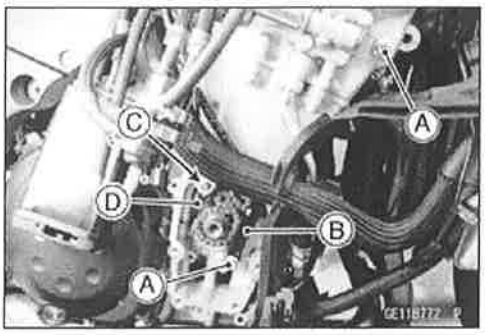
Service Limit:

Exhaust **33.54 mm (1.320 in.)**

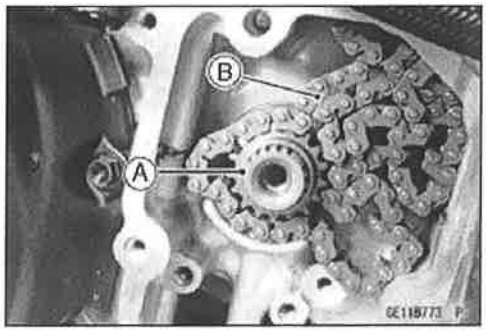
Intake **34.14 mm (1.344 in.)**

Camshaft, Camshaft Chain

Camshaft Chain Removal

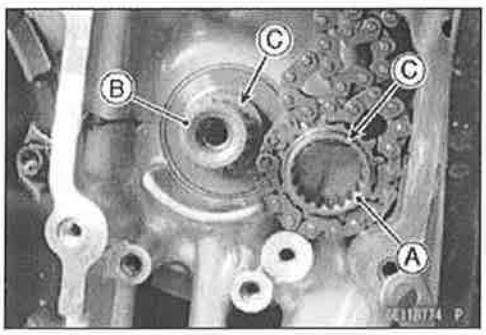


- Remove:
  Camshafts (see Camshaft Removal)
  Timing Rotor (see Timing Rotor Removal in the Electrical System chapter)
  Front Camshaft Chain Guide Bolts [A]
  Front Camshaft Chain Guide [B]
  Dowel Pin [C]
  Rear Camshaft Chain Guide [D]



- Remove the crankshaft sprocket [A] with the camshaft chain [B].
- Pull out the camshaft chain from downward.

Camshaft Chain Installation



- Install the camshaft chain from head side.
- Install the crankshaft sprocket [A] on the crankshaft [B] with their teeth [C] aligned.
- Install:
  Camshaft Chain Guides (see Cylinder Head Installation)
  Timing Rotor (see Timing Rotor Installation in the Electrical System chapter)

Torque - Front Camshaft Chain Guide Bolt (Upper): 25 N·m (2.5 kgf·m, 18 ft·lb)
Front Camshaft Chain Guide Bolt (Lower): 12 N·m (1.2 kgf·m, 106 in·lb)

- Install the removed parts (see appropriate chapters).

Cylinder Head

Cylinder Compression Measurement

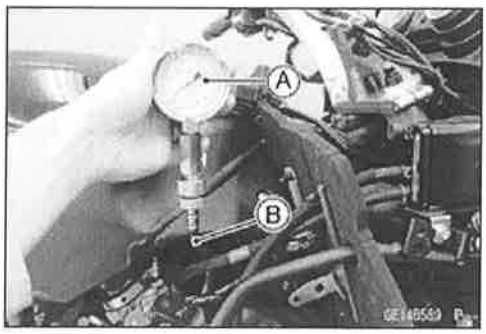
NOTE

○*Use the battery which is fully charged.*

- Warm up the engine thoroughly.
- Stop the engine.
- Remove:
  Stick Coils (see Stick Coil Removal in the Electrical System chapter)
  Spark Plugs (see Spark Plug Replacement in the Periodic Maintenance chapter)

- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.

○Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.



Special Tools - Compression Gauge, 20 kgf/cm²: 57001-221
Compression Gauge Adapter, M10 × 1.0: 57001-1458

Cylinder Compression
Usable Range: 910 ~ 1 398 kPa (9.28 ~ 14.26 kgf/cm², 132 ~ 202.7 psi) @300 r/min (rpm)

- Repeat the measurement for the other cylinders.
- Install the spark plugs.

Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 115 in·lb)

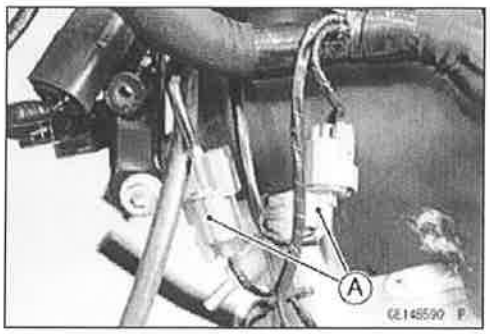
The following table should be consulted if the obtainable compression reading is not within the usable range.

Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness	Replace the gasket with a standard part.
Cylinder compression is lower than usable range	Gas leakage around cylinder head	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating	Repair if necessary.
	Incorrect valve clearance	Adjust the valve clearance.
	Incorrect piston/cylinder clearance	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves	Replace the piston and/or the piston rings.

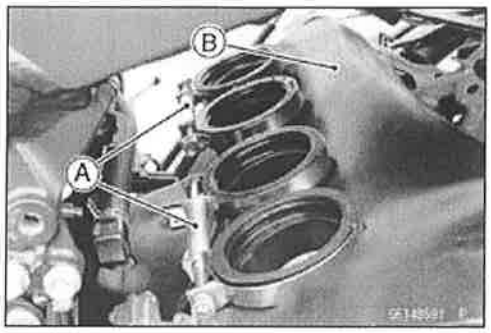
Cylinder Head

Cylinder Head Removal

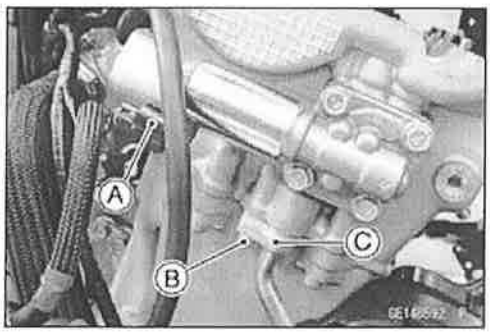
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Coolant Reserve Tank (see Coolant Reserve Tank Removal in the Cooling System chapter)
  Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Exhaust Pipe (see Exhaust Pipe Removal)
- Disconnect the camshaft position sensor connectors [A].



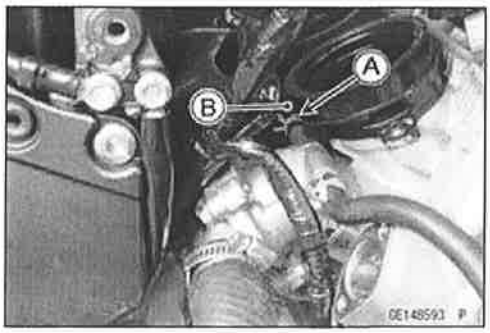
- Remove:
  Camshafts (see Camshaft Removal)
  Camshaft Chain Guides (see Camshaft Chain Removal)
  Throttle Body Holder Clamps [A]
- Move the hear insulation rubber plate [B] backward.



- Disconnect the oil control valve solenoid connector [A].
- Remove the bolt [B], and pull out the oil hose fitting [C].

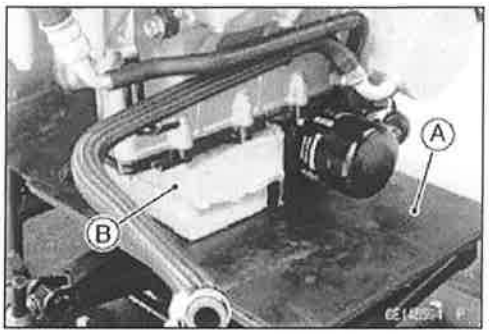


- Slide the clamp [A] and disconnect the air bleed hose [B].

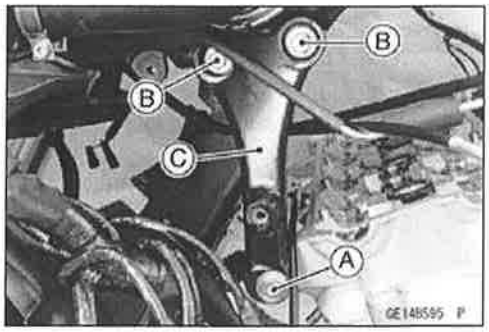


Cylinder Head

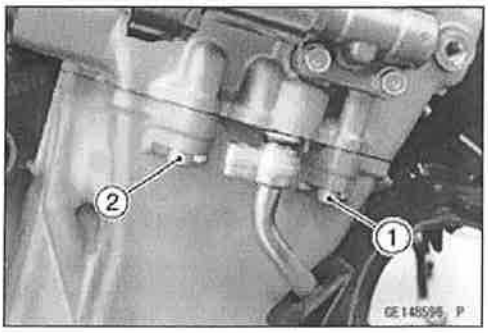
- Support the engine with a suitable stand [A].
- Put a plank [B] on to the suitable stand for engine balance.

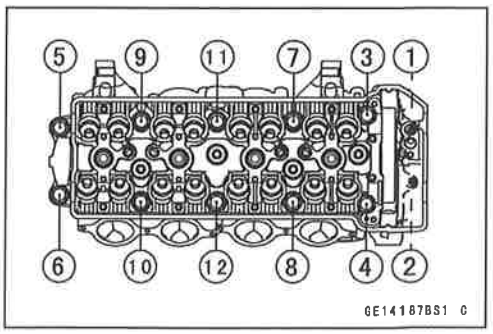


- Remove:
  Front Engine Mounting Bolt [A]
  Engine Bracket Bolts [B]
  Engine Bracket [C]



- Loosen the M6 and M11 cylinder head bolts as shown sequence [1 ~ 12], and remove them.
- Take off the cylinder head.



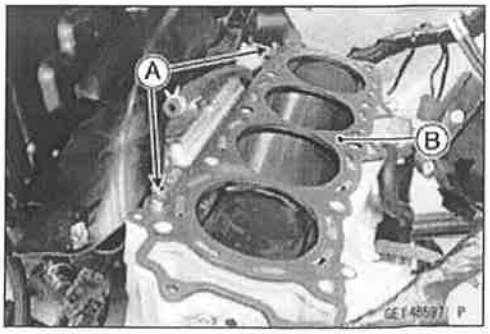


Cylinder Head Installation

NOTE

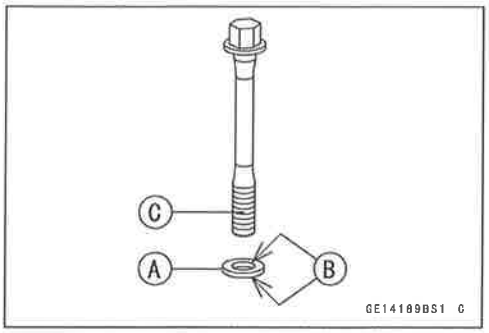
○*The camshaft cap is machined with the cylinder head, so if a new cylinder head is installed, use the cap that is supplied with the new head.*

- Install the dowel pins [A] and new cylinder head gasket [B].



Cylinder Head

- Replace the cylinder head bolt washers [A] with new ones.
- Apply molybdenum disulfide oil solution to both sides [B] of the cylinder head bolt washers and the thread of head bolts [C].

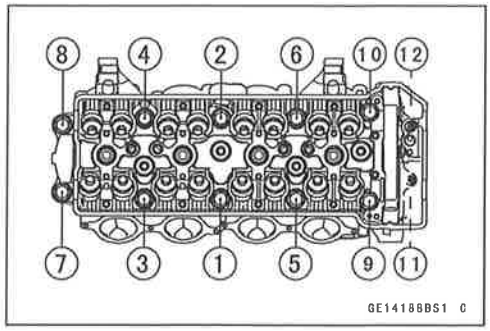


- Tighten the M11 cylinder head bolts following the tightening sequence [1 ~ 10].

Torque - Cylinder Head Bolts (M11):
First: 39 N·m (4.0 kgf·m, 29 ft·lb)
Final: 72 N·m (7.3 kgf·m, 53 ft·lb)

- Tighten the M6 cylinder head bolts [11 ~ 12].

Torque - Cylinder Head Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)



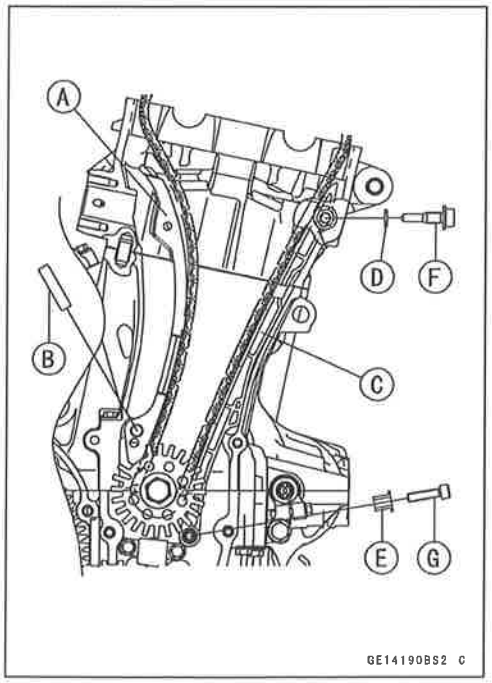
- Install:
  Rear Camshaft Chain Guide [A]
  Dowel Pin [B]
  Front Camshaft Chain Guide [C]
  O-ring [D]
  Collar [E]
- Tighten:

Torque - Front Camshaft Chain Guide Bolt (Upper) [F]: 25 N·m (2.5 kgf·m, 18 ft·lb)
Front Camshaft Chain Guide Bolt (Lower) [G]: 12 N·m (1.2 kgf·m, 106 in·lb)

- Replace the following bolts with new bolts pre-coated with locking agent and torque them.
  Engine Bracket Bolts
  Front Engine Mounting Bolts
  Subframe Bolts

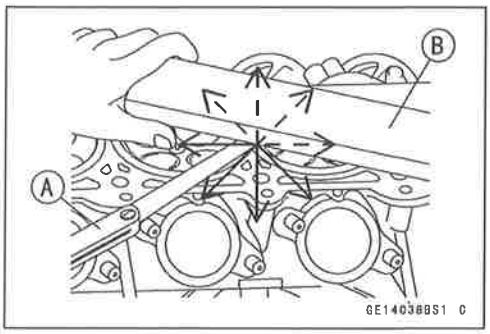
Torque - Engine Bracket Bolts (M8): 25 N·m (2.5 kgf·m, 18 ft·lb)
Front Engine Mounting Bolts (M10): 60 N·m (6.1 kgf·m, 44 ft·lb)
Subframe Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)

- Install the removed parts (see appropriate chapters).



Cylinder Head

Cylinder Head Warp Inspection



- Clean the cylinder head.
- Lay a straightedge across the lower surface of the cylinder head at several positions.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the head.

Cylinder Head Warp
Standard: – – –
Service Limit: 0.05 mm (0.002 in.)

★ If the cylinder head is warped more than the service limit, replace it.

★ If the cylinder head is warped less than the service limit, repair the head by rubbing the lower surface on emery paper secured to a surface plate (first No. 200, then No. 400).

Valves

Valve Clearance Inspection

- Refer to the Valve Clearance Inspection in the Periodic Maintenance chapter.

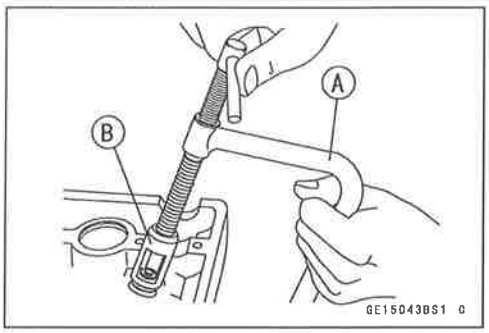
Valve Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Remove the valve lifter and shim.

OMark and record the valve lifter and shim locations so they can be installed in their original positions.

- Using the valve spring compressor assembly, remove the valve.

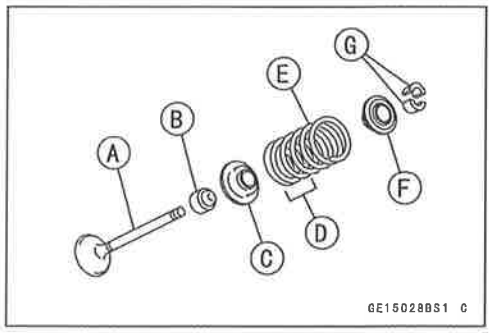
Special Tools - Valve Spring Compressor Assembly: 57001 -241 [A]
Valve Spring Compressor Adapter, ϕ24: 57001-1586 [B]



Valve Installation

- Replace the oil seal with a new one.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the springs so that the closed coil end faces downwards.

Valve Stem [A]
Oil Seal [B]
Spring Seat [C]
Closed Coil End [D]
Valve Spring [E]
Retainer [F]
Split Keepers [G]

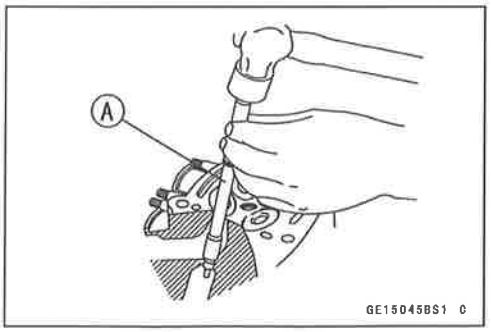


Valve Guide Removal

- Remove:

Valve (see Valve Removal)
Oil Seal
Spring Seat

- Heat the area around the valve guide to 120 ~ 150°C (248 ~ 302°F), and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.



NOTICE

Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head in oil and heat the oil.

Special Tool - Valve Guide Arbor, ϕ5: 57001-1203

Valve Guide Installation

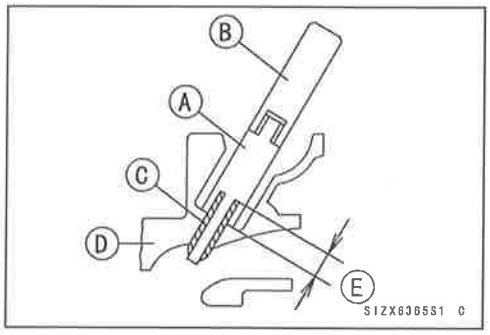
- Apply oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F).

NOTICE

Do not heat the cylinder head with a torch. This Will warp the cylinder head. Soak the cylinder head and heat the oil.

Valves

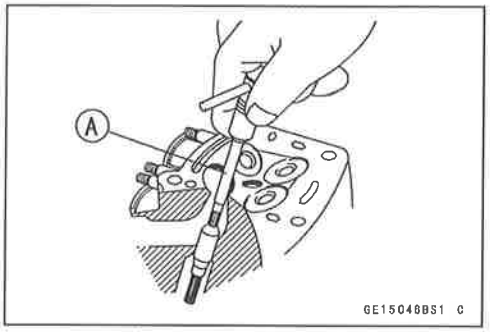
- Assembly the valve guide driver parts (Holder and attachment E).
- Insert the rod of the driver into the valve guide bore and hammer the end of the driver until it bottoms.
  Valve Guide Driver Attachment E [A]
  Valve Guide Driver (Holder) [B]
  Valve Guide [C]
  Cylinder Head [D]
  Valve Guide Installed Height: 12.8 ~ 13.0 mm (0.504 ~ 0.512 in.) [E]



Special Tools - Valve Guide Driver: 57001-1564
Valve Guide Driver Attachment, E: 57001 -1677

- Ream the valve guide with valve guide reamer [A], even if the old guide is reused.

Special Tool - Valve Guide Reamer, ϕ5: 57001-1204

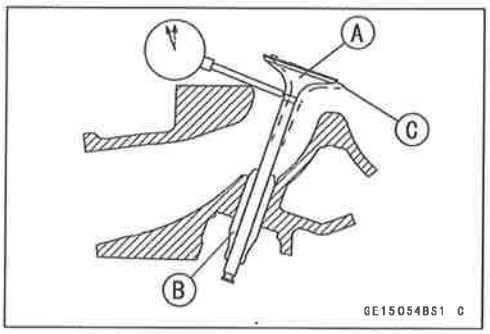


Valve-to-Guide Clearance Measurement (Wobble Method)

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.

★If the reading exceeds the service limit, replace the guide.



NOTE

○*The reading is not actual valve/valve guide clearance because the measuring point is above the guide.*

Valve/Valve Guide Clearance (Wobble Method)

Standard:

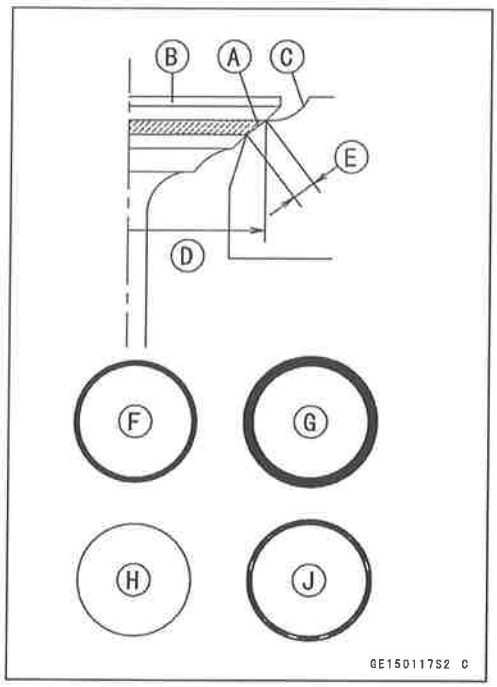
Exhaust	**0.09 ~ 0.18 mm (0.0035 ~ 0.0071 in.)**
Intake	**0.03 ~ 0.12 mm (0.0012 ~ 0.0047 in.)**

Service Limit:

Exhaust	**0.39 mm (0.015 in.)**
Intake	**0.33 mm (0.013 in.)**

Valves

Valve Seat Inspection



- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].

○Measure the outside diameter [D] of the seating pattern on the valve seat.

★If the outside diameter is too large or too small, repair the seat (see Valve Seat Repair).

Valve Seating Surface Outside Diameter
Standard:

Exhaust	**27.6 ~ 27.8 mm (1.09 ~ 1.09 in.)**
Intake	**32.6 ~ 32.8 mm (1.28 ~ 1.29 in.)**

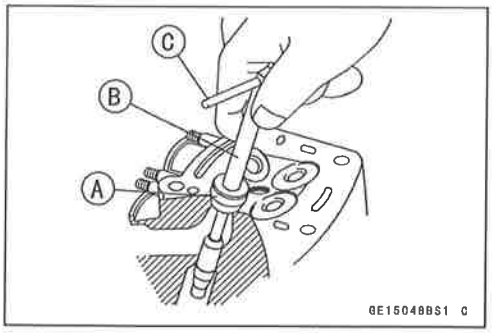
○Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.
Good [F]

★If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

Valve Seating Surface Width
Standard:

Exhaust	**0.8 ~ 1.2 mm (0.032 ~ 0.047 in.)**
Intake	**0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)**

Valve Seat Repair



- Repair the valve seat with the valve seat cutters [A].

Special Tools - Valve Seat Cutter Holder, φ5: 57001-1208 [B]
Valve Seat Cutter Holder Bar: 57001-1128 [C]

For Exhaust Valve Seat
Valve Seat Cutter, 45° - φ30: 57001-1187
Valve Seat Cutter, 32° - φ30: 57001-1120
Valve Seat Cutter, 60° - φ30: 57001-1123
For Intake Valve Seat
Valve Seat Cutter, 45° - φ35: 57001-1116
Valve Seat Cutter, 32° - φ35: 57001-1121
Valve Seat Cutter, 60° - φ33: 57001-1334

★If the manufacturer's instructions are not available, use the following procedure.

Valves

Seat Cutter Operation Care

1. This valve seat cutter is developed to grind the valve for repair. Therefore the cutter must not be used for other purposes than seat repair.
2. Do not drop or shock the valve seat cutter, or the diamond particles may fall off.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

NOTE

○*Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.*

4. Setting the valve seat cutter holder in position, operate the cutter in one hand. Do not apply too much force to the diamond portion.

NOTE

○*Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.*

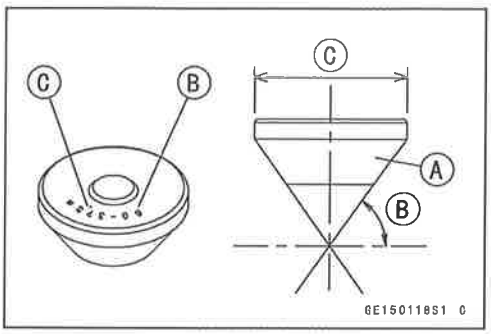
5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

Marks Stamped on the Cutter

The marks stamped on the back of the cutter [A] represent the following.

60° ..... Cutter angle [B]

ϕ37.5 ..... Outer diameter of cutter [C]



Operating Procedures

- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

NOTICE

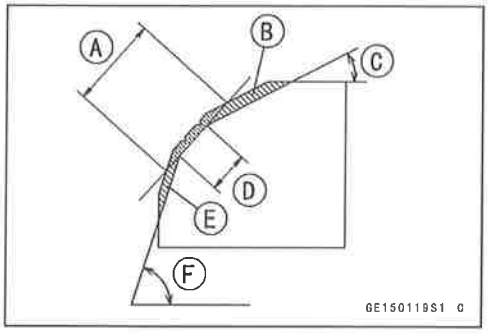
Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

Valves

- Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.

Widened Width [A] of engagement by machining with 45° cutter
Ground Volume [B] by 32° cutter
32° [C]
Correct Width [D]
Ground Volume [E] by 60° cutter
60° [F]



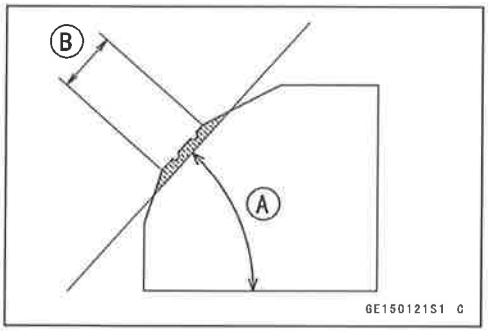
- Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.

Original Seating Surface [B]

NOTE

○*Remove all pittings of flaws from 45° ground surface.*
○*After grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 60° grinding operation easier.*
○*When the valve guide is replaced, be sure to grind with 45° cutter for centering and good contact.*



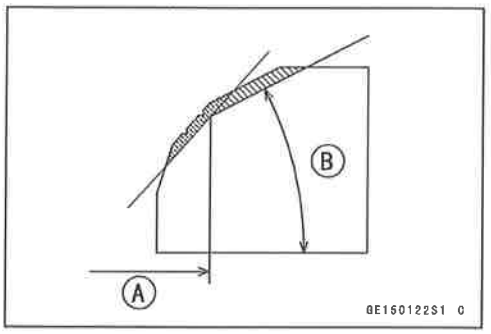
★If the outside diameter [A] of the seating surface is too large, make the 32° grind described below.

★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.

- Grind the seat at a 32° angle [B] until the seat O.D. is within the specified range.

○To make the 32° grind, fit a 32° cutter into the holder, and slide it into the valve guide.

○Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.



NOTICE

The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

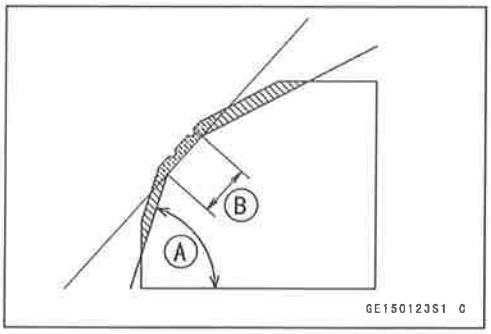
○After making the 32° grind, return to the seat O.D. measurement step above.

- To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.

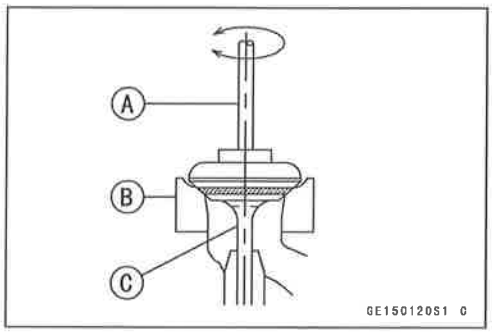
★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat O.D. measurement step above.

Valves

★If the seat width is too wide, make the 60° [A] grind described below.
★If the seat width is within the specified range, lap the valve to the seat as described below.
• Grind the seat at a 60° angle until the seat width is within the specified range.
○To make the 60° grind, fit 60° cutter into the holder, and slide it into the valve guide.
○Turn the holder, while pressing down lightly.
○After making the 60° grind, return to the seat width measurement step above.
Correct Width [B]

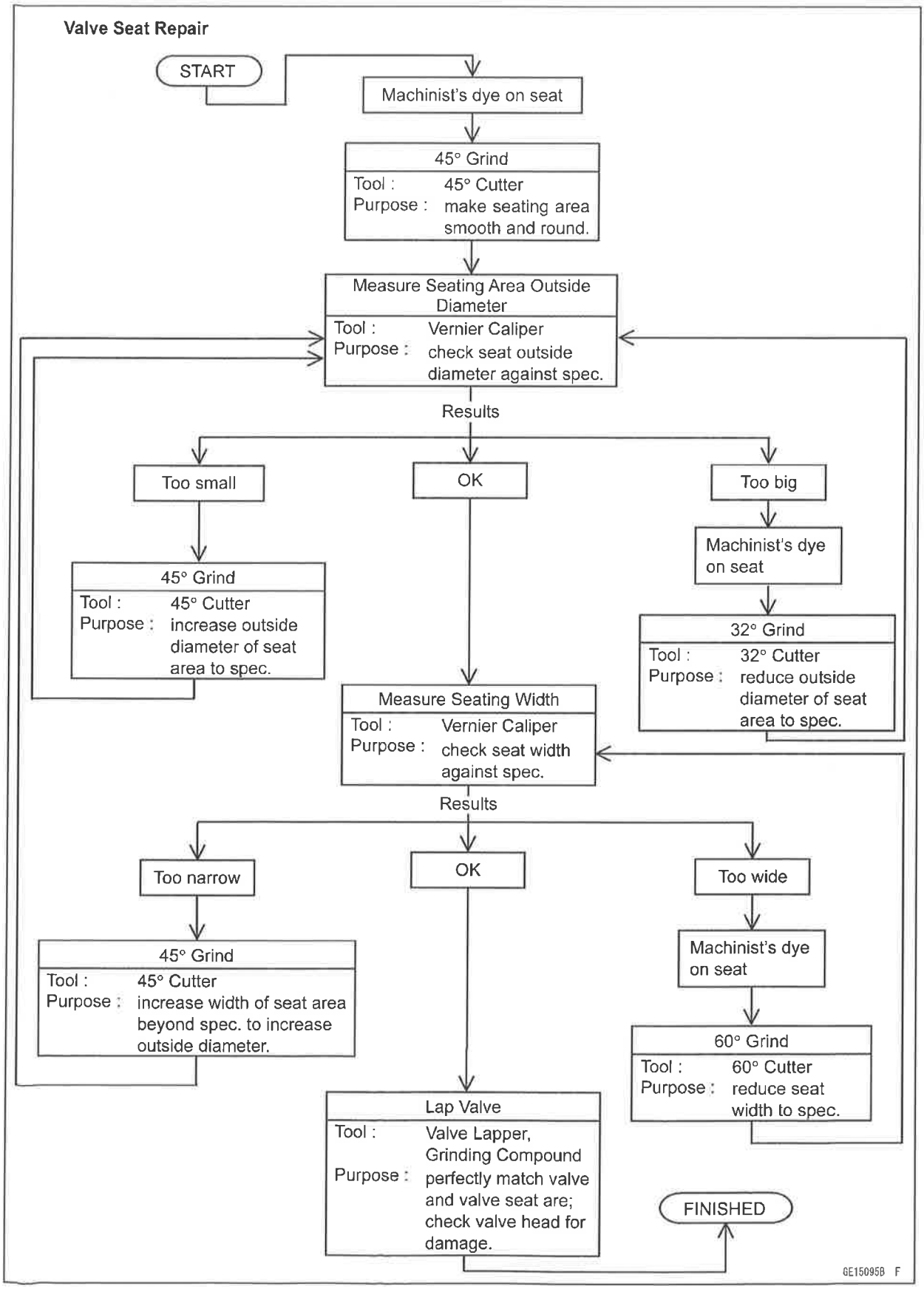


• Lap the valve to the valve seat, once the seat width and O.D. are within the ranges specified above.
○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
○Repeat the process with a fine grinding compound.
Lapper [A]
Valve Seat [B]
Valve [C]



• The seating area should be marked about in the middle of the valve face.
★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
• Be sure to remove all grinding compound before assembly.
• When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).

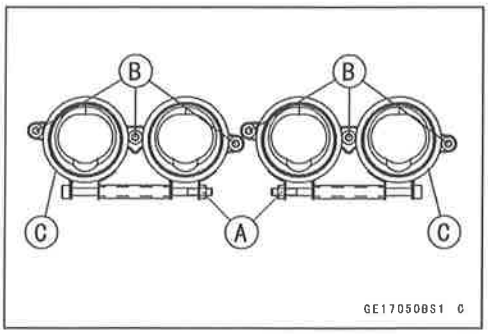
Valves


Valve Seat Repair
START
Machinist's dye on seat
45° Grind
Tool : 45° Cutter
Purpose : make seating area smooth and round.
Measure Seating Area Outside Diameter
Tool : Vernier Caliper
Purpose : check seat outside diameter against spec.
Results
Too small
OK
Too big
45° Grind
Tool : 45° Cutter
Purpose : increase outside diameter of seat area to spec.
Machinist's dye on seat
32° Grind
Tool : 32° Cutter
Purpose : reduce outside diameter of seat area to spec.
Measure Seating Width
Tool : Vernier Caliper
Purpose : check seat width against spec.
Results
Too narrow
OK
Too wide
45° Grind
Tool : 45° Cutter
Purpose : increase width of seat area beyond spec. to increase outside diameter.
Machinist's dye on seat
60° Grind
Tool : 60° Cutter
Purpose : reduce seat width to spec.
Lap Valve
Tool : Valve Lapper, Grinding Compound
Purpose : perfectly match valve and valve seat are; check valve head for damage.
FINISHED
GE15095B F

Throttle Body Assy Holder

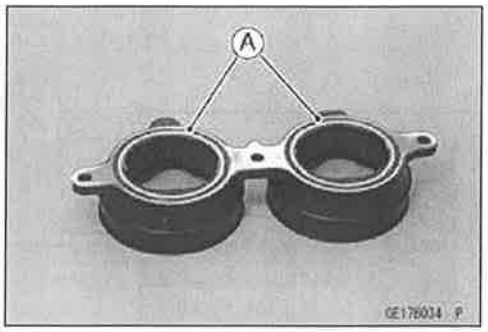
Throttle Body Assy Holder Removal

- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Clamps [A]
  Throttle Body Assy Holder Bolts [B]
  Throttle Body Assy Holders [C]

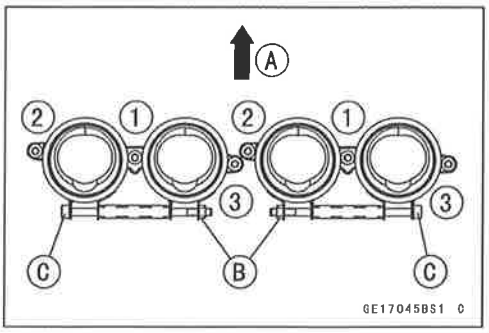


Throttle Body Assy Holder Installation

- Replace the O-rings [A] with new ones.
- Apply liquid gasket to the O-rings, and install them.
  Sealant - Liquid Gasket, TB1211F: 92104-0004



- Tighten the throttle body assy holder bolts following the tightening sequence [1 ~ 3].
  [A] Upward
  Torque - Throttle Body Assy Holder Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Install:
  Clamps [B]
  Throttle Body Assy (see Throttle Body Assy Installation in the Fuel System (DFI) chapter)
  Torque - Throttle Body Assy Holder Clamp Bolts [C]: 2.0 N·m (0.20 kgf·m, 18 in·lb)



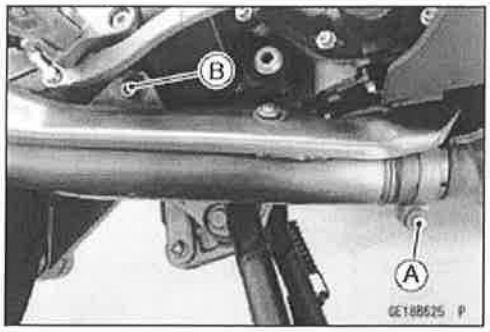
Muffler

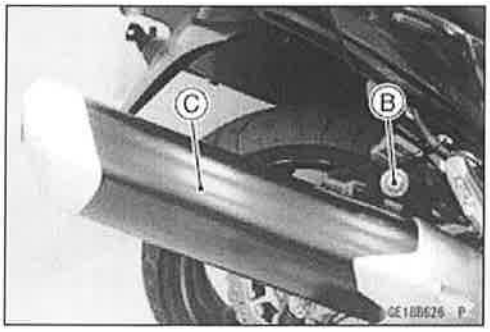
⚠ WARNING

The muffler can become extremely hot during normal operation and cause severe burns. Do not remove the muffler while it is hot.

Muffler Body Removal

- Remove the right saddlebag (see Saddlebag Removal in the Frame chapter).
- Loosen the muffler clamp bolt [A].
- Remove the muffler mounting bolts [B] and nuts.
- Pull the muffler body [C] backward.





Muffler Body Installation

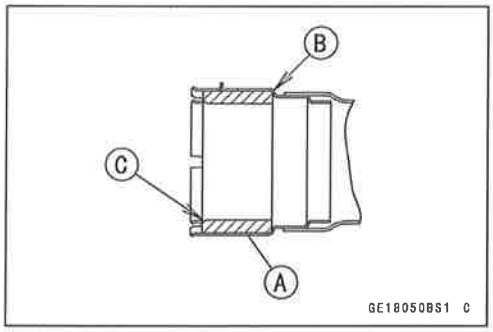
- Replace the muffler gasket [A] with a new one.
- Install the gasket until it is bottomed [B].

○Install the gasket so that the chamfer side [C] faces the front.

- Tighten:

Torque - Muffler Body Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)
Muffler Body Clamp Bolt: 17 N·m (1.7 kgf·m, 13 in·lb)

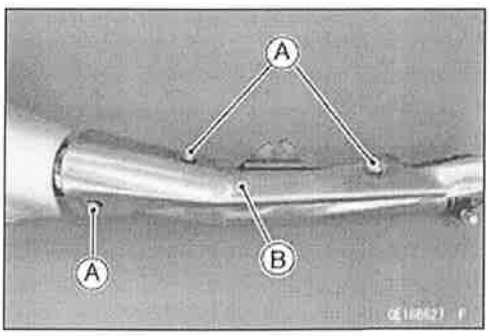
- Install the removed parts (see appropriate chapters).



Exhaust Pipe Cover Removal/Installation

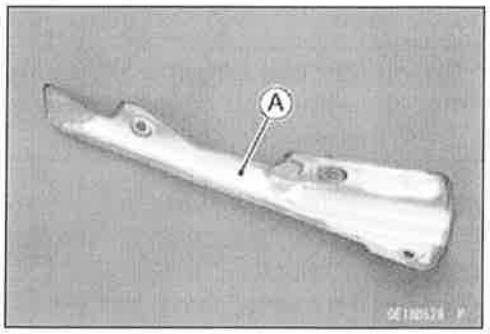
- Remove:

Muffler Body (see Muffler Body Removal)
Exhaust Pipe Cover Bolts [A]
Collars
Dampers
Exhaust Pipe Cover [B]



Muffler

- Be sure that the pad [A] is in place.

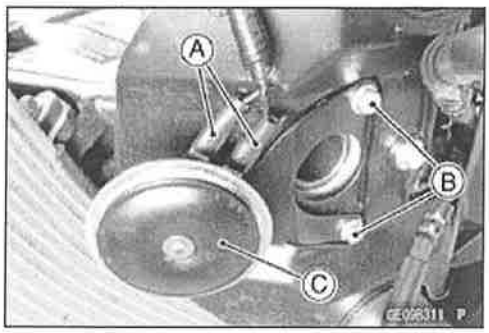


- Installation is the reverse of removal.
- Tighten:

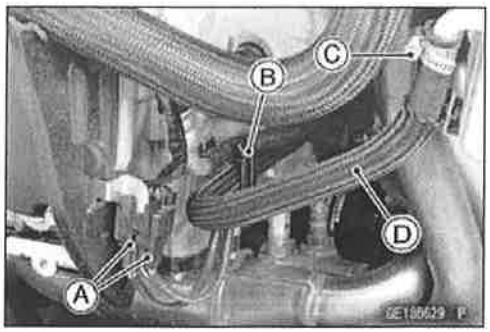
Torque - Exhaust Pipe Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Exhaust Pipe Removal

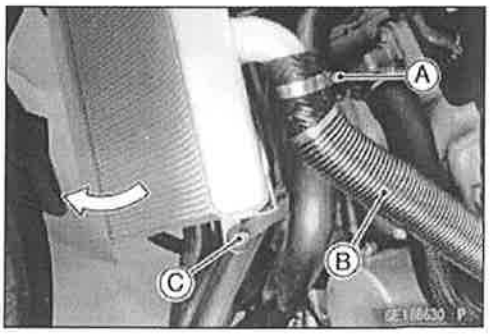
- Remove:
  Front Middle Fairings (see Front Middle Fairing Removal in the Frame chapter)
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Disconnect the horn connectors [A].
- Remove:
  Horn Mounting Bolts [B]
  Horn [C]



- Disconnect the sensor connectors [A], and open the clamp [B].
- Loosen the clamp screw [C] and disconnect the water hose [D].

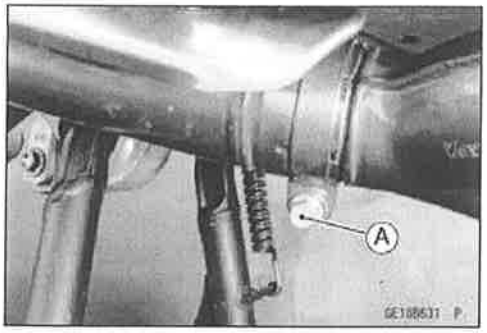


- Loosen the clamp screw [A] and disconnect the water hose [B].
- Remove the radiator bolt [B].
- Move the radiator forward.

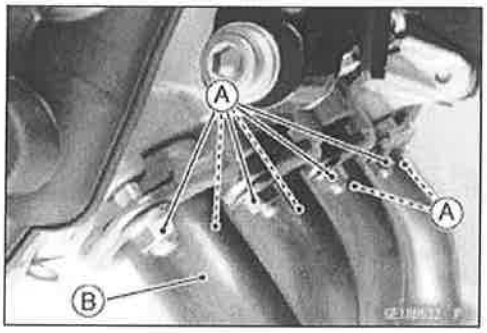


Muffler

- Loosen the muffler clamp bolt [A].

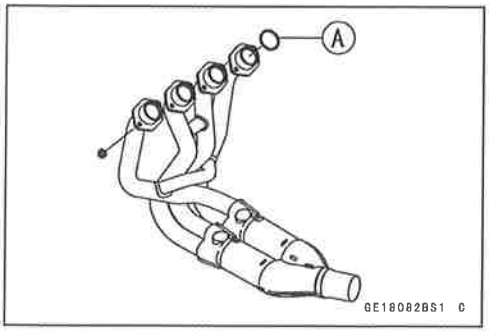


- Remove:
  Exhaust Pipe Manifold Holder Nuts [A]
  Exhaust Pipe Manifold [B]



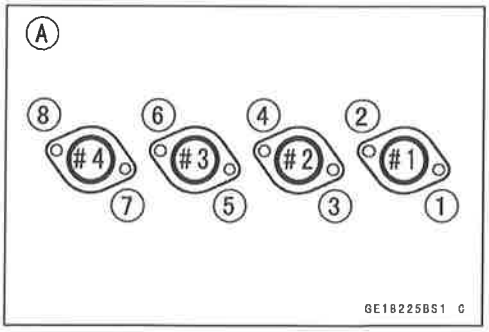
Exhaust Pipe Installation

- Replace the exhaust pipe gaskets [A] and muffler gasket with new ones and install them.
- Install the muffler gasket until it is bottomed so that the chamfer side faces front (see Muffler Body Removal/Installation).



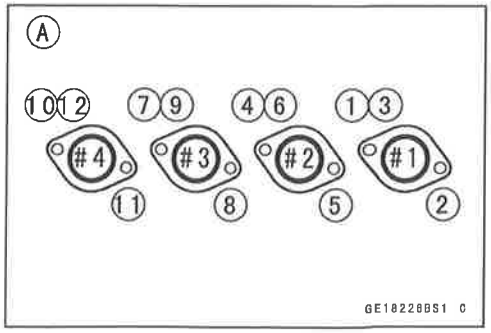
- Tighten the exhaust pipe manifold holder nuts following the specified tightening sequence [1 ~ 8].
  View from Front [A]

Torque - Exhaust Pipe Manifold Holder Nuts: 10 N·m (1.0 kgf·m, 89 in·lb)



- Retighten the exhaust pipe manifold holder nuts following the specified tightening sequence [1 ~ 12].
  View from Front [A]

Torque - Exhaust Pipe Manifold Holder Nuts: 17.2 N·m (1.75 kgf·m, 12.7 in·lb)
Muffler Body Clamp Bolt: 17 N·m (1.7 kgf·m, 13 in·lb)



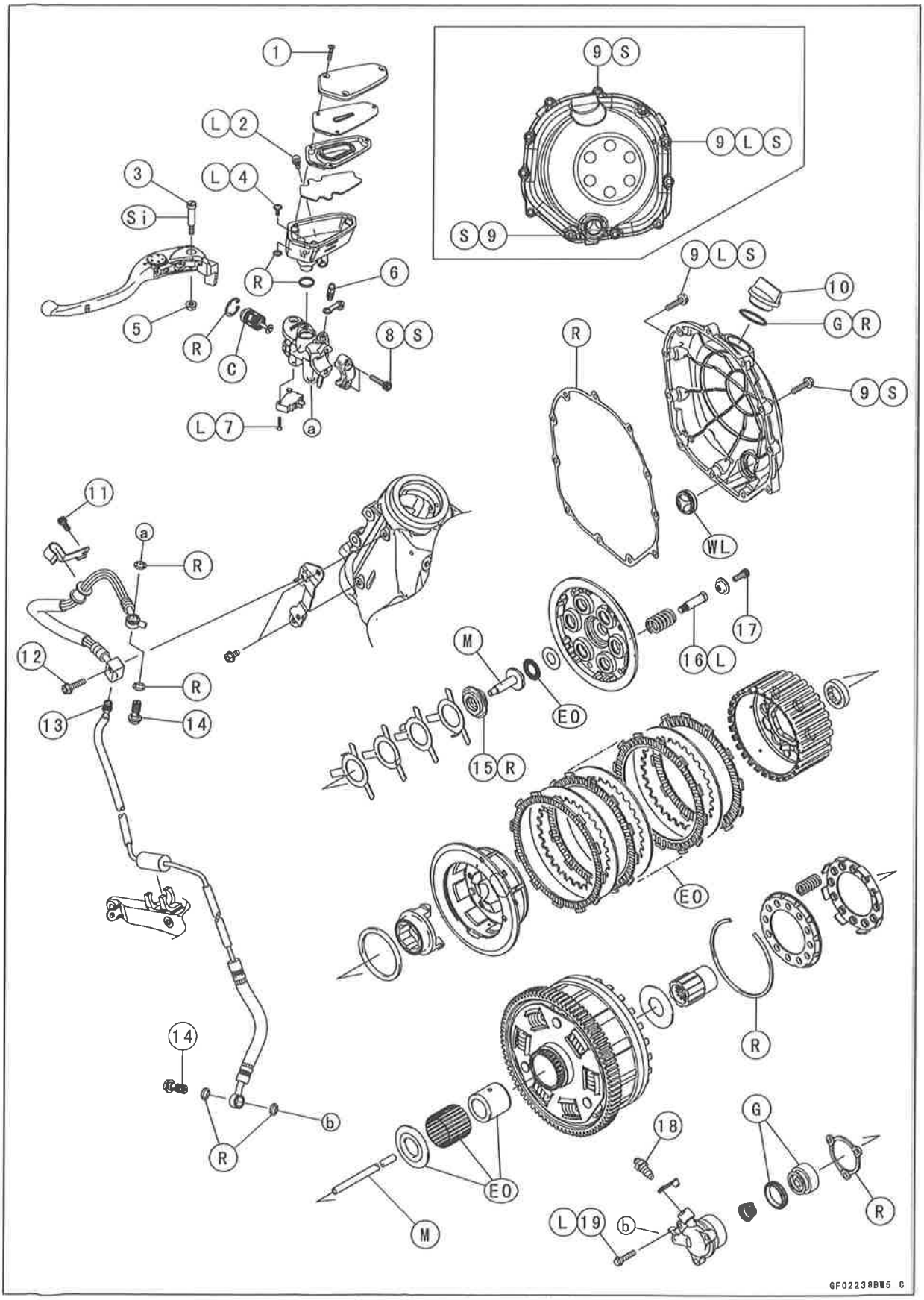
- Install the removed parts (see appropriate chapters).

Clutch

Table of Contents

Exploded View 6-2
Specifications 6-4
Special Tools and Sealant 6-5
Clutch Master Cylinder 6-6
  Clutch Lever Installation 6-6
  Clutch Lever Adjustment 6-6
  Clutch Master Cylinder Removal 6-7
  Clutch Master Cylinder Installation 6-7
  Clutch Master Cylinder Disassembly 6-7
  Clutch Master Cylinder Assembly 6-7
  Clutch Master Cylinder Inspection 6-8
Clutch Slave Cylinder 6-9
  Clutch Slave Cylinder Removal 6-9
  Clutch Slave Cylinder Installation 6-9
  Clutch Slave Cylinder Disassembly 6-10
  Clutch Slave Cylinder Assembly 6-10
Clutch Fluid 6-11
  Clutch Fluid Level Inspection 6-11
  Clutch Fluid Change 6-11
  Bleeding the Clutch Line 6-11
  Clutch Hose Removal/Installation 6-13
  Clutch Hose Inspection 6-13
Clutch Cover 6-14
  Clutch Cover Removal 6-14
  Clutch Cover Installation 6-14
Clutch 6-15
  Clutch Removal 6-15
  Clutch Installation 6-16
  Clutch Hub Disassembly 6-19
  Clutch Hub Assembly 6-19
  Spring Plate Free Play Measurement 6-19
  Spring Plate Free Play Adjustment 6-20
  Clutch Plate Assembly Length (Reference Information) Inspection 6-21
  Clutch Plate, Wear, Damage Inspection 6-21
  Clutch Plate Warp Inspection 6-21
  Clutch Housing Finger Inspection 6-22
  Clutch Housing Spline Inspection 6-22
  Cam Damper Inspection 6-22
  Damper Cam Inspection 6-22
  Clutch Spring Inspection 6-22

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Reservoir Cap Screws	1.5	0.15	13 in·lb	
2	Clutch Reservoir Bolt	7.8	0.80	69 in·lb	L
3	Clutch Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si
4	Clutch Reservoir Screw	1.3	0.13	12 in·lb	L
5	Clutch Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
6	Clutch Master Cylinder Bleed Valve	5.4	0.55	48 in·lb	
7	Starter Lockout Switch Screw	0.70	0.07	6.2 in·lb	L
8	Clutch Master Cylinder Clamp Bolts	10	1.0	89 in·lb	S
9	Clutch Cover Bolts	9.8	1.0	87 in·lb	L (1), S
10	Oil Filler Plug	–	–	–	Hand-tighten
11	Clutch Hose Clamp Bolt	8.0	0.82	71 in·lb	
12	Clutch Hose Fitting Bolt	8.0	0.82	71 in·lb	
13	Clutch Pipe Joint Nuts	18	1.8	13	
14	Clutch Hose Banjo Bolts	25	2.5	18	
15	Clutch Hub Nut	135	13.8	100	R
16	Sub Clutch Hub Bolts	25	2.5	18	L
17	Clutch Spring Bolts	11	1.1	97 in·lb	
18	Clutch Slave Cylinder Bleed Valve	8.4	0.86	74 in·lb	
19	Clutch Slave Cylinder Bolts	9.8	1.0	87 in·lb	L

C: Apply clutch fluid.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.
WL: Apply soap and water solution or rubber lubricant.

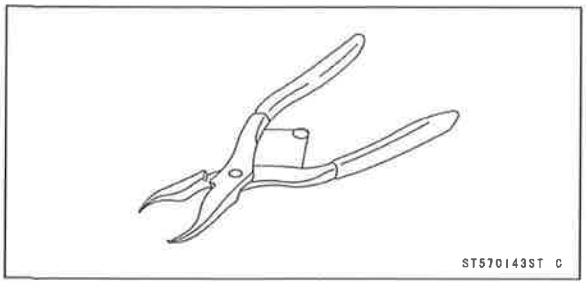
6-4 CLUTCH

Specifications

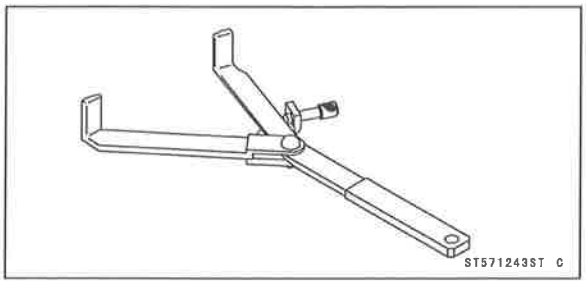
Item	Standard	Service Limit
Clutch Fluid		
Grade	DOT4	– – –
Clutch Lever		
Clutch Lever Position	5-way adjustable (to suit rider)	– – –
Clutch Lever Free Play	Non-adjustable	– – –
Clutch		
Spring Plate Free Play	(Usable Range)	
	0.05 ~ 0.70 mm (0.002 ~ 0.028 in.)	– – –
Clutch Plate Assembly Length	54.2 mm (2.13 in.) (Reference)	– – –
Friction Plate Thickness:		
13088-0031	2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)	2.8 mm (0.11 in.)
13008-0033, 13088-0037	3.72 ~ 3.88 mm (0.146 ~ 0.153 in.)	3.6 mm (0.14 in.)
Friction Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.01 in.)
Steel Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.01 in.)

Special Tools and Sealant

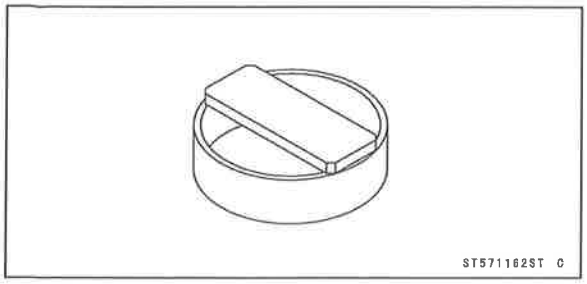
Inside Circlip Pliers:
57001-143



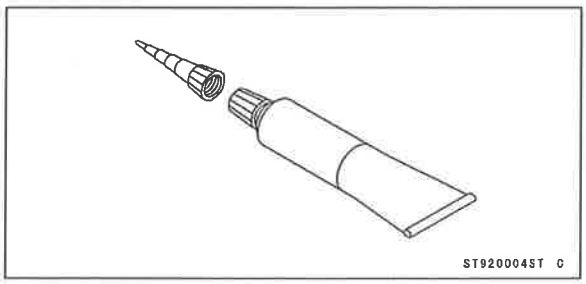
Clutch Holder:
57001-1243



Clutch Spring Compressor:
57001-1162



Liquid Gasket, TB1211F:
92104-0004



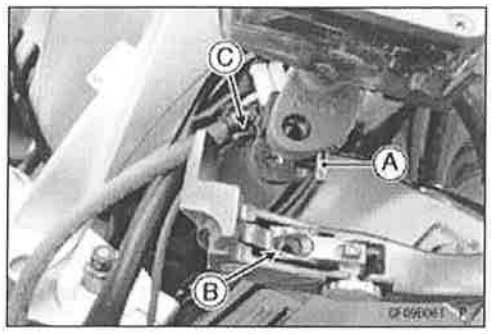
Clutch Master Cylinder

Clutch Lever Installation

⚠ WARNING

If the starter lockout switch pin has been damaged the starter lockout system will not work properly. This allows the motorcycle to be started in gear with the clutch lever released (clutch engaged), creating sudden forward movement that can result in an accident or injury. Check that the starter lockout switch operates properly when installing the clutch lever.

- Insert the push rod [A] of the master cylinder to the hole [B] of the clutch lever.

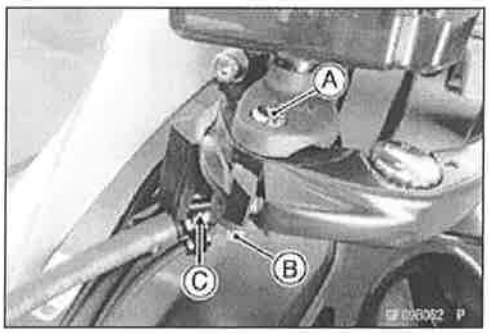


NOTICE

The pin [C] of the starter lockout switch may be damaged in the projection of a clutch lever.

- Apply silicone grease to the sliding surface of the clutch lever pivot bolt [A].
- Tighten the clutch lever pivot bolt and clutch lever pivot bolt locknut [B].

Torque - Clutch Lever Pivot Bolt: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)
Clutch Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)



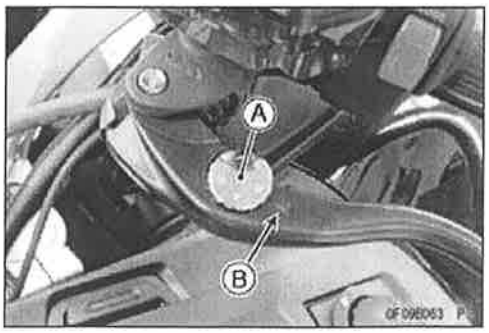
- Check that the pin [C] of the starter lockout switch moves smoothly.

Clutch Lever Adjustment

The adjuster has 5 positions so that the clutch lever position can be adjusted to suit the operator's hand.

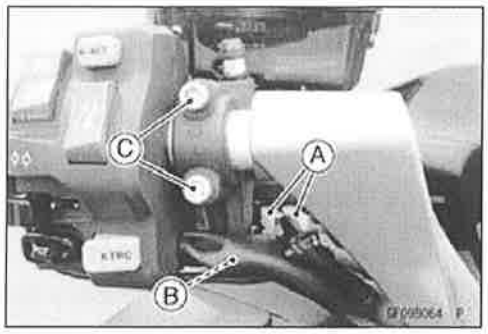
- Push the lever forward and turn the adjuster [A] to align the number with the triangular mark [B] on the lever holder.

○The distance from the grip to the lever is minimum at number 5 and maximum at number 1.



Clutch Master Cylinder

Clutch Master Cylinder Removal

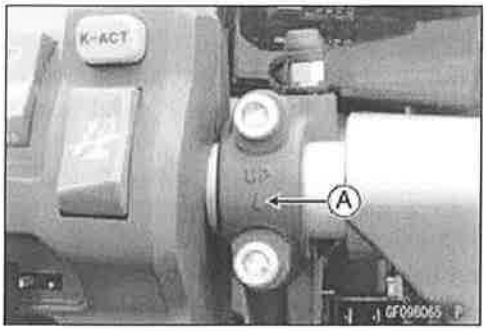


- Disconnect the starter lockout switch connectors [A].
- Drain the clutch fluid from the reservoir (see Clutch Fluid Change in the Periodic Maintenance chapter).
- Remove the banjo bolt [B] to disconnect the clutch hose from the master cylinder.
- Remove the clamp bolts [C], and take off the master cylinder as an assembly with the clutch reservoir, clutch lever and starter lockout switch installed.

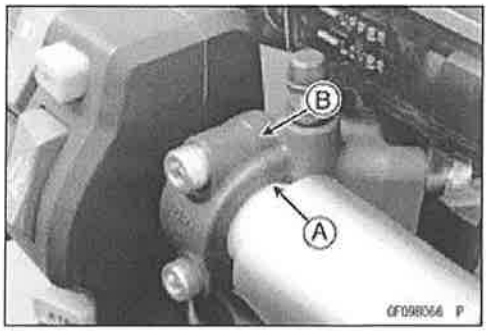
NOTICE

Clutch fluid quickly ruins painted surface; any spilled fluid should be completely washed away immediately.

Clutch Master Cylinder Installation

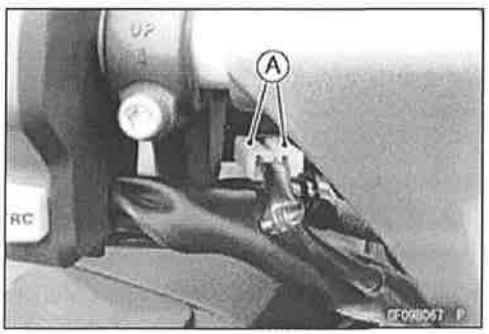


- Install the master cylinder clamp so that the triangular mark [A] faces upward.



- Align the punch mark [A] on the handlebar with the mating surface [B] of the master cylinder clamp.
- Tighten the upper clamp bolt first, and then the lower clamp bolt.

Torque - Clutch Master Cylinder Clamp Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)



- Connect the starter lockout switch connectors [A].
- Replace the washers that are on each side of the clutch hose fitting with new ones.
- Tighten:

Torque - Clutch Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Replenish the clutch fluid into the reservoir and bleed the clutch line (see Bleeding the Clutch Line).
- Check that the clutch line has proper fluid pressure and no fluid leakage.

Clutch Master Cylinder Disassembly

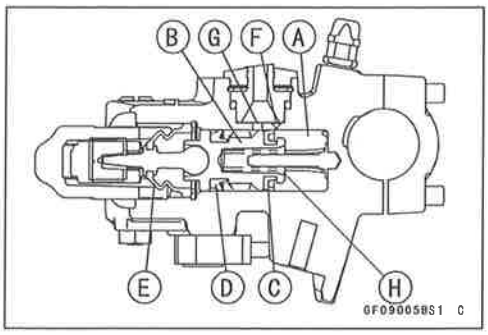
- Refer to the Rubber Parts of Clutch Master Cylinder/Slave Cylinder Replacement in the Periodic Maintenance chapter.

Clutch Master Cylinder Assembly

- Refer to the Rubber Parts of Clutch Master Cylinder/Slave Cylinder Replacement in the Periodic Maintenance chapter.

Clutch Master Cylinder

Clutch Master Cylinder Inspection



- Disassemble the clutch master cylinder (see Rubber Parts of Clutch Master Cylinder/Slave Cylinder Replacement in the Periodic Maintenance chapter).

Special Tool - Inside Circlip Pliers: 57001-143

- Check that there are no scratches, rust or pitting on the inside of the master cylinder [A] and on the outside of the piston [B].

★ If the master cylinder or piston shows any damage, replace them.

- Inspect the primary cup [C] and secondary cup [D].

★ If a cup is worn, damaged, softened (rotted), or swollen, the piston assembly should be replaced to renew the cup.

★ If fluid leakage is noted at the clutch lever, the piston assembly should be replaced to renew the cup.

- Check the dust cover [E] for damage.

★ If it is damaged, replace the piston assembly.

- Check that the relief [F] and supply [G] ports are not plugged.

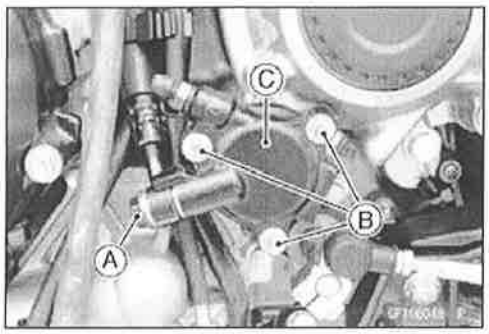
★ If the small relief port becomes plugged, the clutch will drag. Blow the ports clean with compressed air.

- Check the piston return spring [H] for any damage.

★ If the spring is damaged, replace it.

Clutch Slave Cylinder

Clutch Slave Cylinder Removal



- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Banjo Bolt [A]
  Clutch Slave Cylinder Bolts [B]
  Slave Cylinder [C]

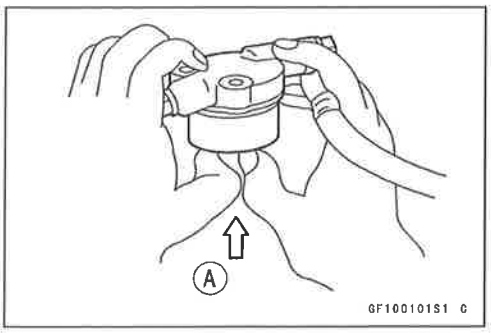
NOTICE

Immediately wash away any clutch fluid that spills. It may damage painted surfaces.

- Perform the following if the clutch slave cylinder is to be removed but not disassembled.

NOTICE

If the clutch slave cylinder is removed and left alone, the piston will be pushed out by spring force and the clutch fluid will drain out.

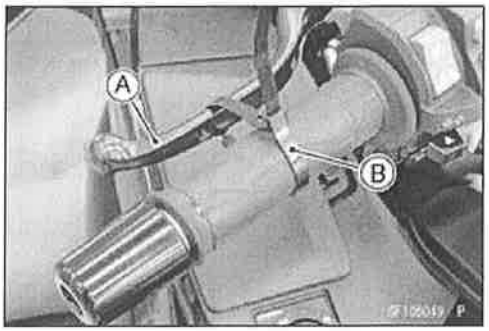


○Remove the clutch slave cylinder from the engine with the pipe installed. Push [A] the piston into the cylinder as far as it will go.

○Apply the clutch lever [A] slowly and hold it with a band [B].

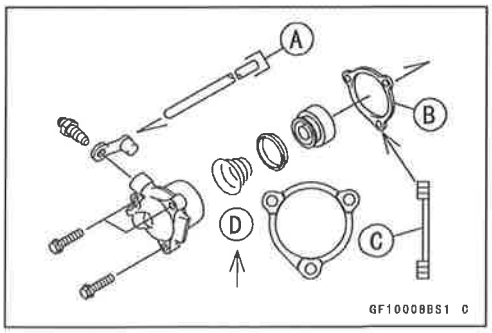
NOTE

○*Holding the clutch lever keeps the piston from coming out.*

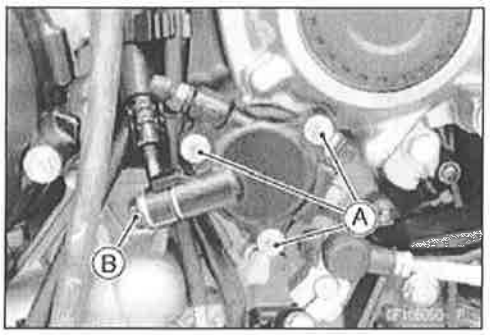


Clutch Slave Cylinder Installation

- Apply molybdenum disulfide grease to either end [A] of the push rod, and install the push rod so that the greased end faces in.
- Replace the spacer [B] of the clutch slave cylinder with a new one.
- Install the spacer so that the stepped side [C] faces outward.
  Upside [D]



Clutch Slave Cylinder



- Apply a non-permanent locking agent to the threads of the slave cylinder bolts [A].
- Finger tighten all the clutch slave cylinder bolts.
- Remove the band from the clutch lever and release the clutch lever.
- Tighten:

Torque - Clutch Slave Cylinder Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Replace the washer on each side of the clutch hose fitting with new one.
- Tighten:

Torque - Clutch Hose Banjo Bolt [B]: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Check the fluid level in the master cylinder reservoir, and bleed the air in the clutch line.
- Check the clutch operation.
- Install the removed parts (see appropriate chapters).

Clutch Slave Cylinder Disassembly

- Refer to the Rubber Parts of Clutch Master Cylinder/Slave Cylinder Replacement in the Periodic Maintenance chapter.

Clutch Slave Cylinder Assembly

- Refer to the Rubber Parts of Clutch Master Cylinder/Slave Cylinder Replacement in the Periodic Maintenance chapter.

Clutch Fluid

Clutch Fluid Level Inspection

- Refer to the Clutch Fluid Level Inspection in the Periodic Maintenance chapter.

Clutch Fluid Change

- Refer to the Clutch Fluid Change in the Periodic Maintenance chapter.

Bleeding the Clutch Line

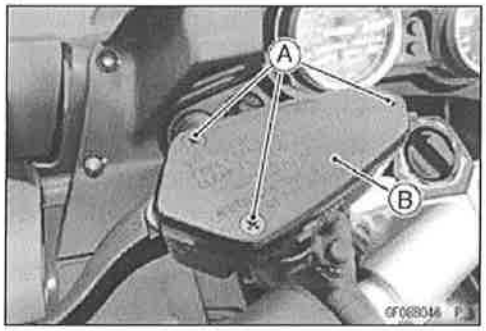
⚠ WARNING

Air in the clutch lines diminish clutch performance and can cause an accident resulting in injury or death. If the clutch lever has a soft or "spongy" feeling mushy when it is applied, there might be air in the clutch lines or the clutch may be defective. Do not operate the vehicle and service the clutch system immediately.

NOTICE

Clutch fluid quickly ruins painted or plastic surfaces; any spilled fluid should be completely wiped up immediately with wet cloth.

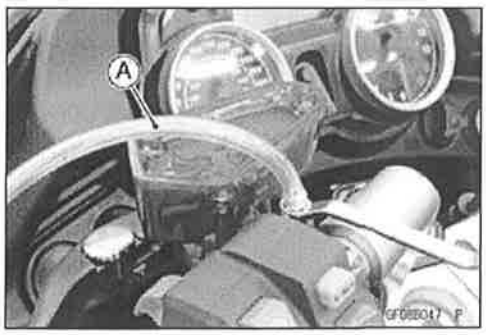
- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Screws [A]
  Clutch Reservoir Cap [B]
  Diaphragm Plate
  Diaphragm
- Fill the reservoir with fresh clutch fluid to the upper level line in the reservoir.



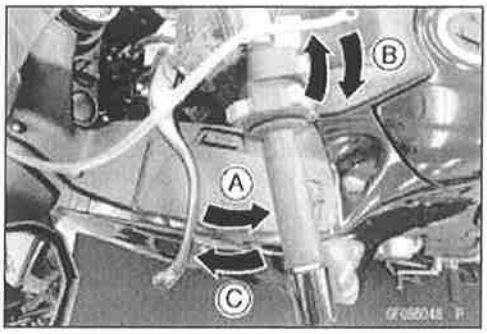
NOTE

○*Tap the clutch hose lightly going from the lower end to upper end and bleed the air off the reservoir.*

- Slowly pump the clutch lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.
- Remove the rubber cap from the bleed valve on the master cylinder.
- Attach a clear plastic hose [A] to the bleed valve, and run the other end of the hose into a container.



Clutch Fluid



- Bleed the clutch line and the master cylinder.

○Repeat this operation until no more air can be seen coming out into the plastic hose.

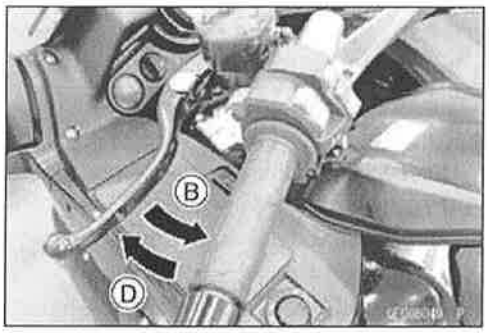
1. Pump the clutch lever until it becomes hard, and apply the clutch lever and hold it [A].
2. Quickly open and close [B] the bleed valve while holding the clutch lever applied.
3. Release the clutch lever [C].

NOTE

○*The fluid level must be checked often during the bleeding operation and replenished with fresh clutch fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*

- Remove the clear plastic hose.
- Tighten the bleed valve, and install the rubber cap.

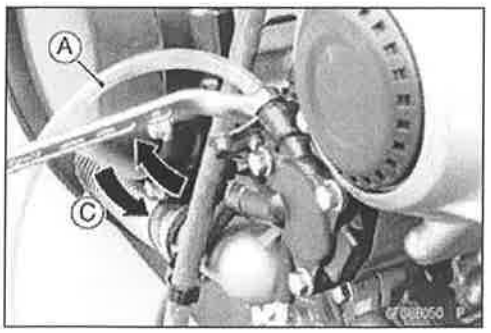
Torque - Clutch Master Cylinder Bleed Valve: 5.4 N·m (0.55 kgf·m, 48 in·lb)



- Remove the rubber cap from the bleed valve.
- Attach a clear plastic hose [A] to the bleed valve on the clutch slave cylinder, and run the other end of the hose into a container.
- Bleed the clutch line as follows.

○Repeat this operation until no more air can be seen coming out into the plastic hose.

1. Pump the clutch lever until it becomes hard, and apply the clutch lever and hold it [B].
2. Quickly open and close [C] the bleed valve while holding the clutch lever applied.
3. Release the clutch lever [D].



NOTE

○*Check the fluid level in the reservoir often, replenishing it as necessary.*

○*If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*

Clutch Fluid

⚠ WARNING

Mixing brands and types of hydraulic fluid lowers the fluid's boiling point, cause rubber part to deteriorate and can reduce the hydraulic clutch system's effectiveness and cause an accident resulting in injury or death. Do not mix two brands of brake fluid. Change the fluid in the hydraulic clutch system completely if the fluid must be refilled but the type and brand of the hydraulic fluid that is already in the reservoir are unidentified.

- Remove the clear plastic hose.
- Tighten the bleed valve, and install the rubber cap.

Torque - Clutch Slave Cylinder Bleed Valve: 8.4 N·m (0.86 kgf·m, 74 in·lb)

- Install:
  Diaphragm
  Diaphragm Plate
  Clutch Reservoir Cap
- Tighten:

Torque - Clutch Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)

- Install the left lower fairing (see Lower Fairing Installation in the Frame chapter).

Clutch Hose Removal/Installation

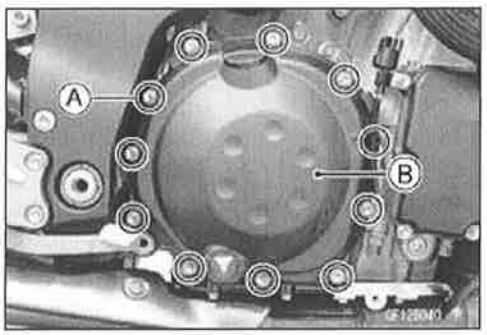
- Refer to the Clutch Hose Replacement in the Periodic Maintenance chapter.

Clutch Hose Inspection

- Refer to the Clutch Hose Damage and Installation Condition Inspection in the Periodic Maintenance chapter.

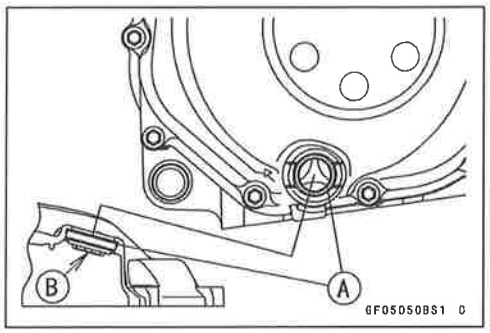
Clutch Cover

Clutch Cover Removal



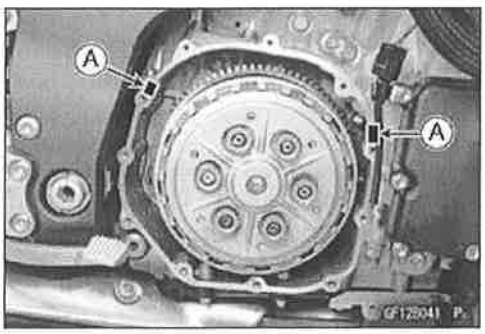
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Clutch Cover Bolts [A]
  Clutch Cover [B]

Clutch Cover Installation



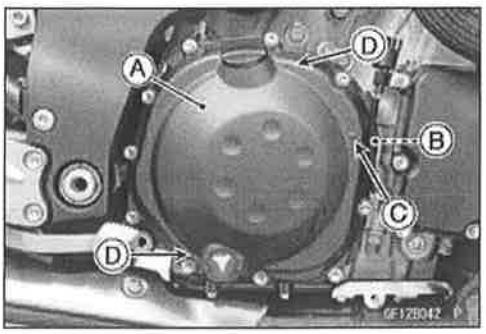
- If the oil gauge [A] is removed, press the gauge so that its projection [B] faces the inside, using lubricant.

○Apply a soap and water solution or rubber lubricant to the outer circumference of the gauge.



- Using a cleaning fluid, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the area [A] where the mating surface of the crankcase touches the clutch cover gasket.

Sealant - Liquid Gasket, TB1211F: 92104-0004



- Replace the clutch cover gasket with a new one.
- Install the clutch cover [A].
- Tighten the clutch cover bolts.

○Apply a non-permanent locking agent to only one clutch cover bolt [B] as shown (circle mark [C] portion bolt).

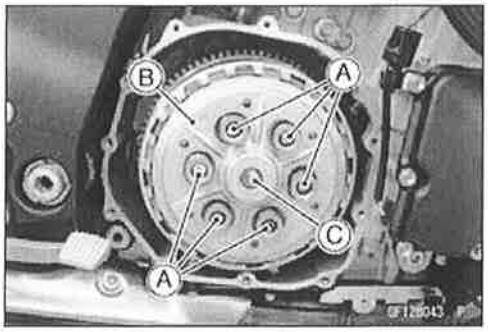
○Tighten the triangular mark [D] portion bolts first, and then other bolts.

Torque - Clutch Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Clutch

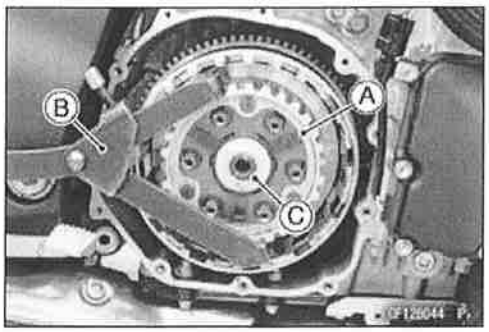
Clutch Removal

- Remove:
  Clutch Cover (see Clutch Cover Removal)
  Clutch Spring Bolts [A] with Spring Holder
  Clutch Springs
  Clutch Spring Plate [B] (with Thrust Bearing, Pusher [C] and Washer)

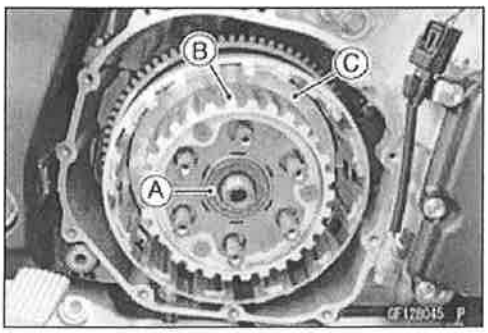


- Remove:
  Friction Plates and Steel Plates
- Hold the sub clutch hub [A] steady with the clutch holder [B], and remove the clutch hub nut [C].

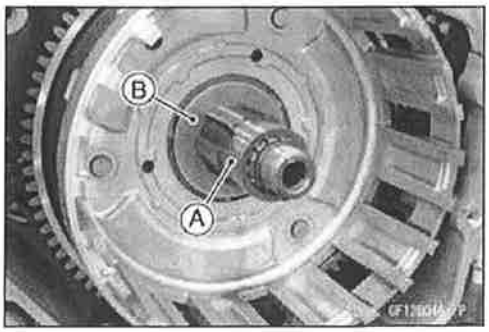
Special Tool - Clutch Holder: 57001-1243



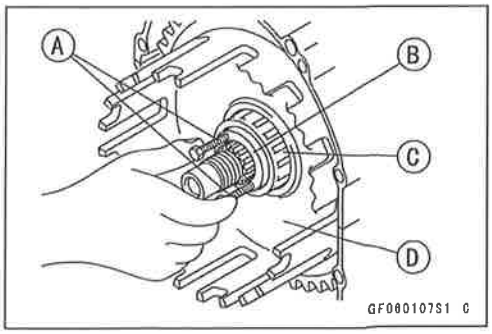
- Remove:
  Torque Limiter Springs
  Toothed Washer [A]
  Sub Clutch Hub [B]
  Clutch Hub [C]



- Remove:
  Clutch Shaft [A]
  Spacer [B]



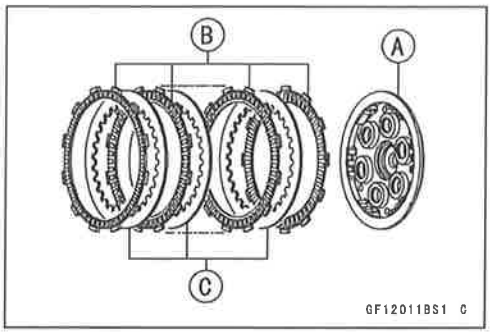
- Using the two 4 mm (0.16 in.) bolts [A], pull out the sleeve [B], needle bearing [C] and clutch housing [D].
- Remove the thrust washer.



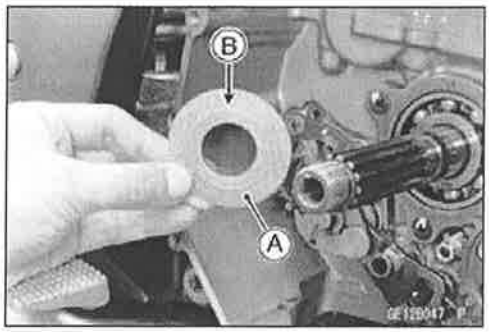
Clutch

Clutch Installation

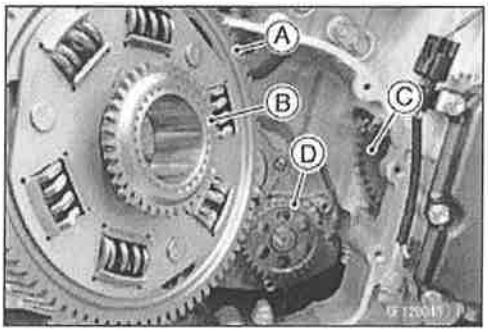
- When replacing any one of the following parts, check the spring plate free play (see Spring Plate Free Play Measurement).
  Spring Plate [A]
  Friction Plates [B]
  Steel Plates [C]



- Install the thrust washer [A] by facing its tapered side [B] towards the crankcase.

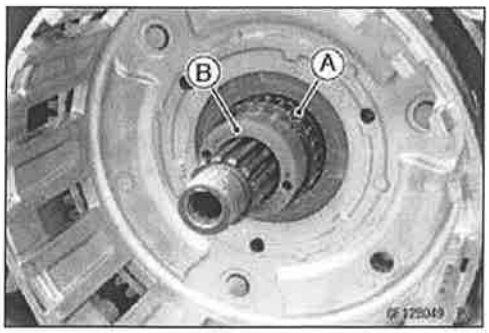


- Engage the clutch housing gear [A] and oil pump drive gear [B] with the crankshaft primary gear [C] and oil pump gear [D].



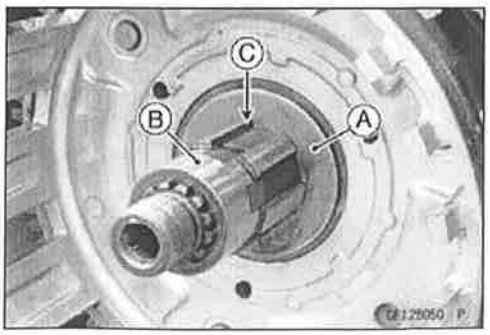
- Install:
  Needle Bearing [A]
  Sleeve [B]

○Apply engine oil to the needle bearing and the sleeve before installation.
○Install the sleeve so that the holes face outward.



- Install the spacer [A] and clutch shaft [B].

○Install the clutch shaft so that the tooth side [C] faces in.



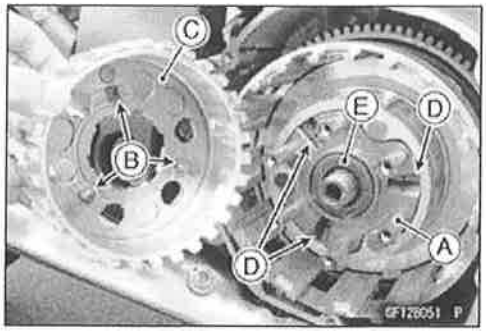
Clutch

★If the sub clutch hub bolts were removed, install them as follows.

○Apply a non-permanent locking agent to the threads of the sub clutch hub bolts, and tighten them.

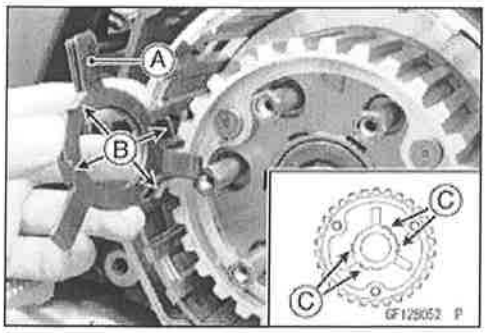
Torque - Sub Clutch Hub Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Install the clutch hub [A] on the drive shaft.
- Align the damper cams [B] of the sub clutch hub [C] to the cam followers [D] of the clutch hub.
- Install the toothed washer [E].



- Install the four torque limiter springs [A] as shown.
  Tangs [B]

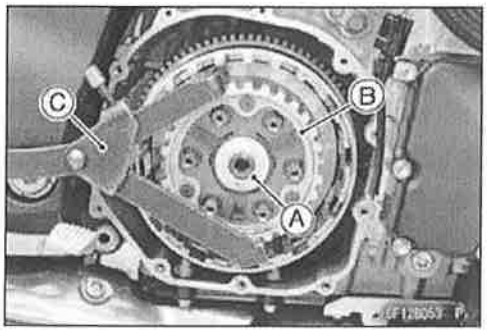
○Do not over lap the tang of the springs.



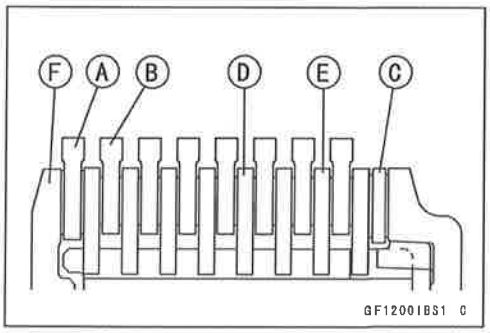
- Replace the clutch hub nut [A] with a new one.
- Hold the sub clutch hub [B] steady with the clutch holder [C], and tighten the clutch hub nut.

Special Tool - Clutch Holder: 57001-1243

Torque - Clutch Hub Nut: 135 N·m (13.8 kgf·m, 100 ft·lb)



- Install the friction plates and steel plates as shown.
  First Friction Plate [A]
  Friction Plates [B]
  Outer-End Friction Plate [C]
  Adjusting Steel Plate [D]
  Steel Plates [E]
  Clutch Hub [F]

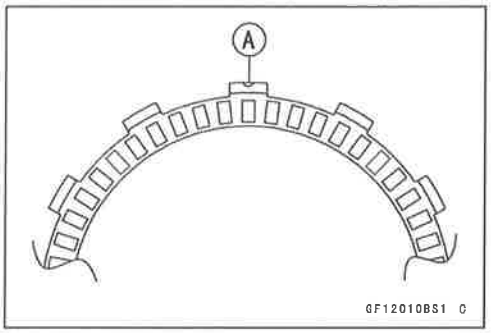


NOTICE

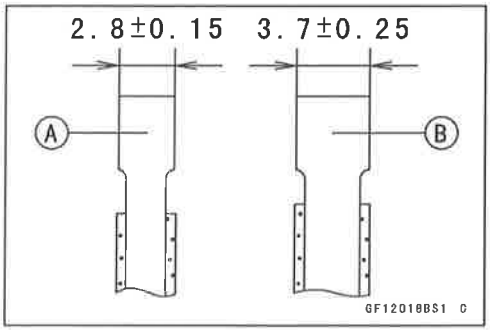
If new dry friction plates and steel plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

Clutch

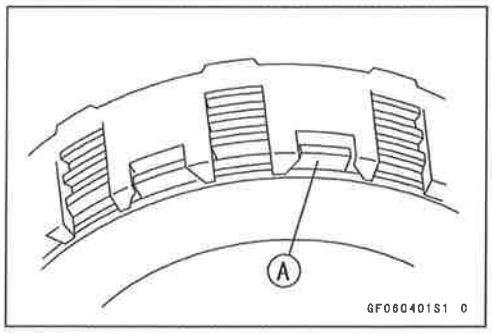
○Install the friction plates that has notches [A] between the first and outer-end friction plates.



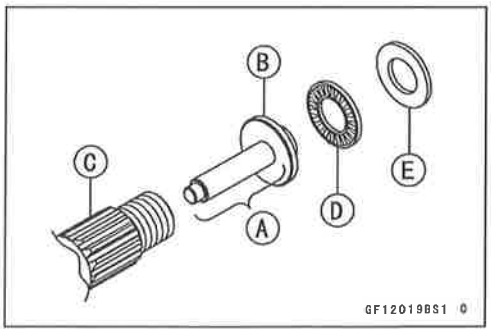
○Lastly, install the outer-end friction plate [A] that is made with the thinner plate than others [B].



- Install the last friction plate [A] fitting the tangs in the grooves in the housing as shown.

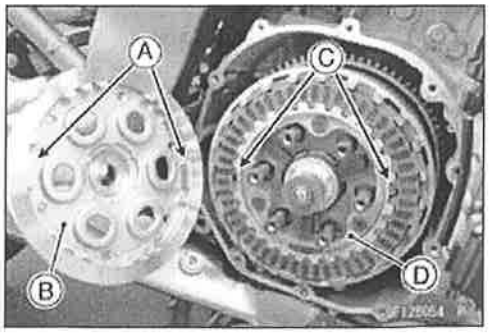


- Apply molybdenum disulfide grease to the outside surface [A] of the pusher [B].
- Install the pusher into the drive shaft [C].
- Apply engine oil to the needle bearing [D].
- Install:
  Needle Bearing
  Washer [E]



- Align the projection [A] of the spring plate [B] to the grooves [C] of the sub clutch hub [D] to install the spring plate on the sub clutch hub.
- Install the clutch springs, spring holders, and tighten the clutch spring bolts.

  Torque - Clutch Spring Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)
- Install the clutch cover (see Clutch Cover Installation).

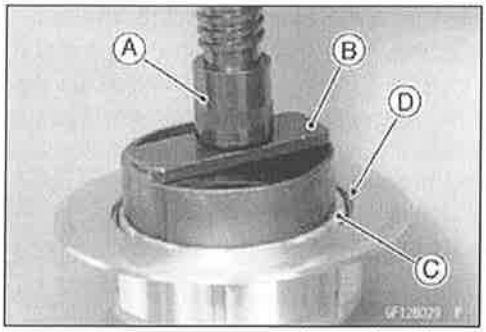


Clutch

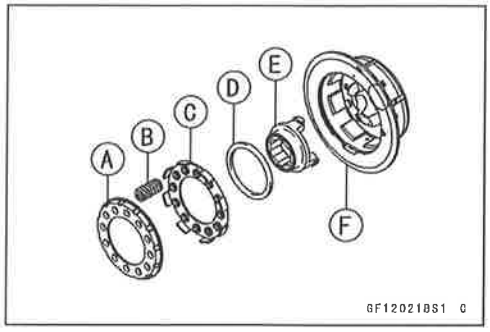
Clutch Hub Disassembly

- Remove the clutch hub (see Clutch Removal).
- Using a press [A], and the clutch spring compressor [B], push the damper spring holder [C] to remove the retaining ring [D].

Special Tool - Clutch Spring Compressor: 57001-1162



- Remove:
  Spring Holder [A]
  Damper Springs [B]
  Spring Holder [C]
  Spacer [D]
  Damper Cam [E]
  Clutch Hub [F]



Clutch Hub Assembly

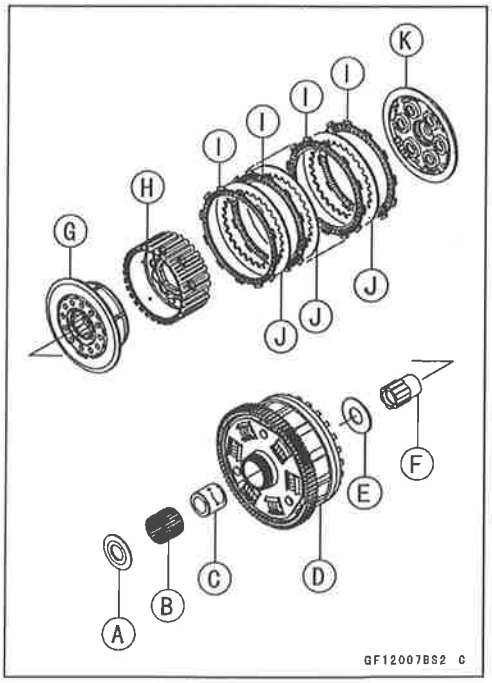
- Replace the retaining ring with a new one.
- Installation is the reverse of removal.

Special Tool - Clutch Spring Compressor: 57001-1162

Spring Plate Free Play Measurement

Insufficient clutch free play will cause the engine braking effect to be more sudden, resulting in rear wheel hop. On the other hand, if the free play is excessive, the clutch lever may feel "spongy" or pulsate when pulled.

- Hold an extra drive shaft in a vise and install the following clutch parts on the shaft (see Clutch Installation).
  Thrust Washer [A]
  Needle Bearing [B]
  Sleeve [C]
  Clutch Housing [D]
  Spacer [E]
  Clutch Shaft [F]
  Clutch Hub Assembly [G]
  Sub Clutch Hub [H]
  Friction Plates [I]
  Steel Plates [J]
  Spring Plate [K]

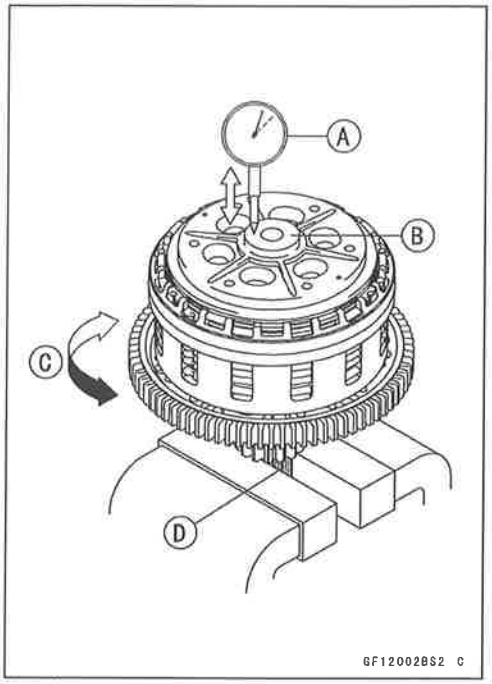


Clutch

- Engage the clutch hub with the sub clutch hub.
- To measure the free play, set a dial gauge [A] against the raised center [B] of the clutch spring plate.
- Move the clutch housing gear back and forth [C]. The difference between the highest and lowest gauge readings is the amount of free play.
  Drive Shaft [D]
- Measure the spring plate free play.

Spring Plate Free Play
Usable Range: 0.05 ~ 0.70 mm (0.002 ~ 0.028 in.)

★If the free play is not within the usable range, change all of the friction plate and measure the free play again.
★If the free play is not within the usable range, adjust the free play (see Spring Plate Free Play Adjustment).



Spring Plate Free Play Adjustment

NOTE

○*The free play adjustment is performed by replacing the steel plate(s).*

- Measure the clutch spring plate free play (see Clutch Spring Plate Free Play Measurement), and then replace the steel plate(s) which brings the free play within the usable range.

Spring Plate Free Play
Usable Range: 0.05 ~ 0.70 mm (0.002 ~ 0.028 in.)

○Replace the following steel plate(s).

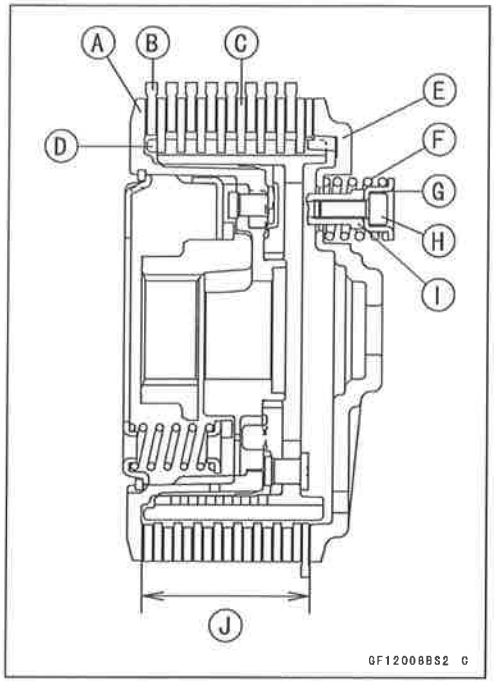
Thickness	Part Number
2.3 mm (0.090 in.)	13089-0019
2.6 mm (0.102 in.) (STD)	13089-0018
2.9 mm (0.114 in.)	13089-0020

NOTE

○*Do not use the steel plate of 2.3 mm (0.091 in.) and 2.9 mm (0.114 in.) thickness at the same time.*

Clutch

Clutch Plate Assembly Length (Reference Information) Inspection



- Inspect the friction plate thickness (see Clutch Plate, Wear, Damage Inspection).
- Assemble:
  Clutch Hub [A]
  Friction Plates [B]
  Steel Plates [C]
  Sub Clutch Hub [D]
  Spring Plate [E]
  Clutch Springs [F]
  Clutch Spring Holders [G]
  Clutch Spring Bolts [H]
  Clutch Hub Bolts [I]

Torque - Clutch Spring Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

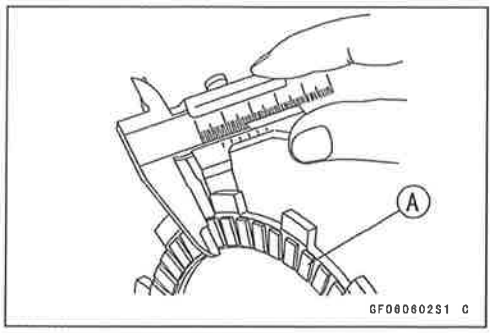
- Measure the clutch plate assembly length [J].

Clutch Plate Assembly Length (Reference)
Standard: 54.2 mm (2.13 in.)

NOTE

○*The length of the clutch plate assembly changes by the steel plate thickness.*

Clutch Plate, Wear, Damage Inspection



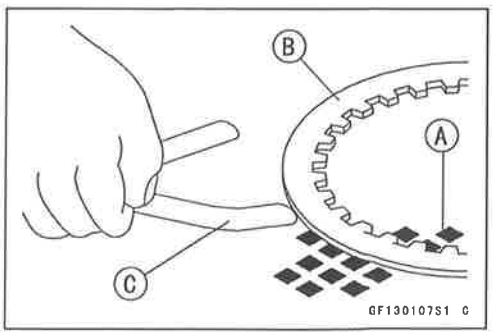
- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
- Measure the thickness of each friction plate [A] at several points.

★If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.

Friction Plate Thickness (13088-0031)
Standard: 2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)
Service Limit: 2.8 mm (0.11 in.)

Friction Plate Thickness (13088-0033, 13088-0037)
Standard: 3.72 ~ 3.88 mm (0.146 ~ 0.153 in.)
Service Limit: 3.6 mm (0.14 in.)

Clutch Plate Warp Inspection



- Place each friction plate or steel plate on a surface plate and measure the gap between the surface plate [A] and each friction plate or steel plate [B] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp.

★If any plate is warped over the service limit, replace it with a new one.

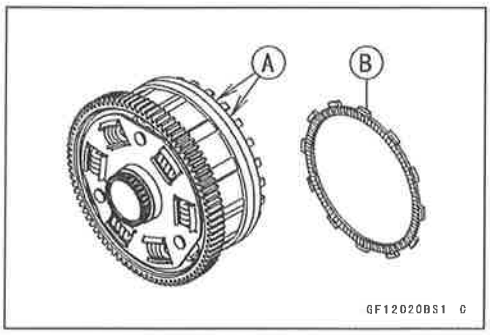
Friction and Steel Plate Warp
Standard: 0.15 mm (0.0059 in.) or less
Service Limit: 0.3 mm (0.01 in.)

Clutch

Clutch Housing Finger Inspection

- Visually inspect the clutch housing fingers [A] where the friction plate tangs [B] hit them.

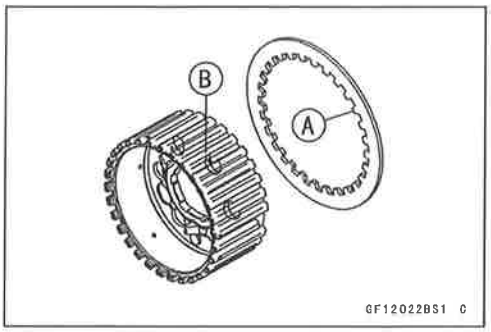
★ If they are badly worn or if there are groove cuts where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.



Clutch Housing Spline Inspection

- Visually inspect where the teeth [A] on the steel plates wear against the sub clutch hub splines [B].

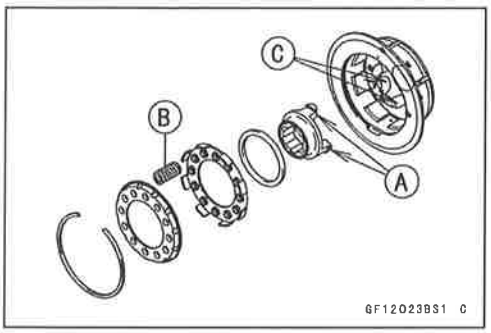
★ If there are notches worn into the splines, replace the sub clutch hub. Also, replace the steel plates if their teeth are damaged.



Cam Damper Inspection

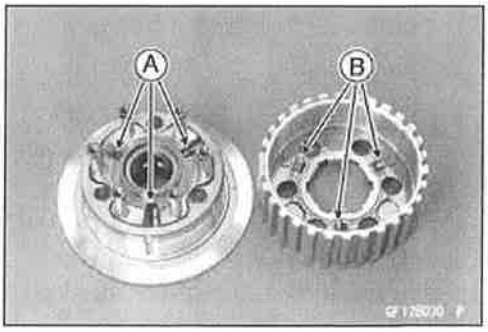
- Disassemble the clutch hub (see Clutch Hub Disassembly).
- Visually inspect the damper cams [A], damper springs [B], and cam follower [C].

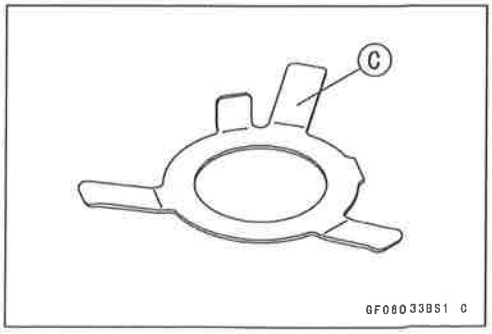
★ Replace any part that appears damaged.



Damper Cam Inspection

- Remove the clutch (see Clutch Removal).
- Visually inspect the damper cam [A], cam follower [B], and the torque limiter spring [C].
- Replace the part if it appears damaged.





Clutch Spring Inspection

★ If all the components are good, but the problem still exists, replace the clutch springs (see Clutch Removal and Clutch Installation).

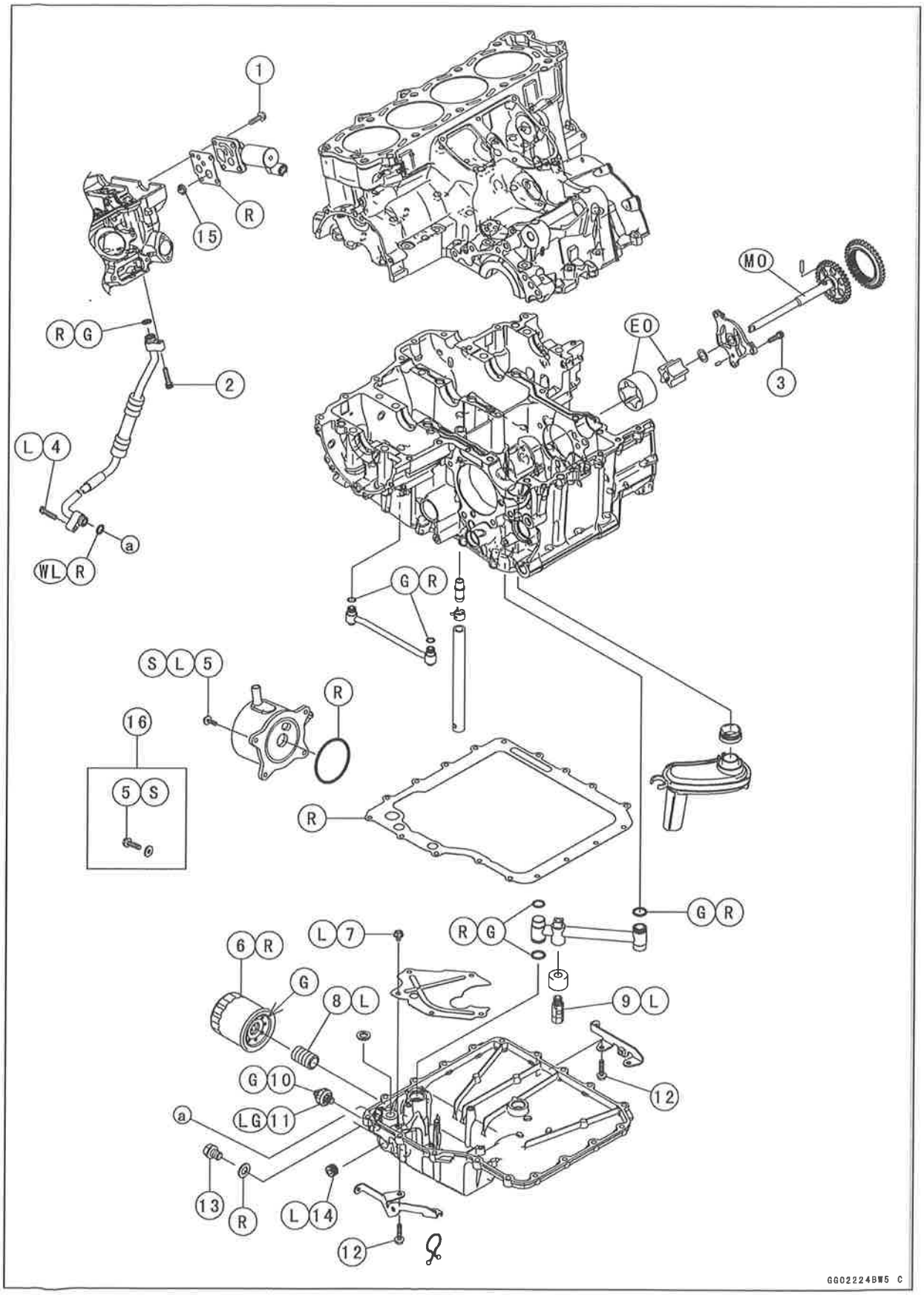
Engine Lubrication System

Table of Contents

Exploded View 7-2
Engine Oil Flow Chart 7-4
Specifications 7-10
Special Tools and Sealants 7-11
Engine Oil and Oil Filter 7-12
  Oil Level Inspection 7-12
  Engine Oil Change 7-12
  Oil Filter Replacement 7-12
Oil Pan 7-13
  Oil Pan Removal 7-13
  Oil Pan Installation 7-14
Oil Pressure Relief Valve 7-15
  Oil Pressure Relief Valve Removal 7-15
  Oil Pressure Relief Valve Installation 7-15
  Oil Pressure Relief Valve Inspection 7-15
Oil Pump 7-16
  Oil Pump Removal 7-16
  Oil Pump Installation 7-16
Oil Cooler 7-18
  Oil Cooler Removal 7-18
  Oil Cooler Installation 7-18
Oil Pressure Measurement 7-19
  Oil Pressure Measurement 7-19
Oil Pressure Switch 7-20
  Oil Pressure Switch Removal 7-20
  Oil Pressure Switch Installation 7-20
VVT (Variable Valve Timing) 7-21
  Oil Pipe Removal 7-21
  Oil Pipe Installation 7-22
  Oil Control Solenoid Valve Removal 7-22
  Oil Control Solenoid Valve Installation 7-22
  Variable Valve Timing Actuator Removal/Installation 7-23

7-2 ENGINE LUBRICATION SYSTEM

Exploded View



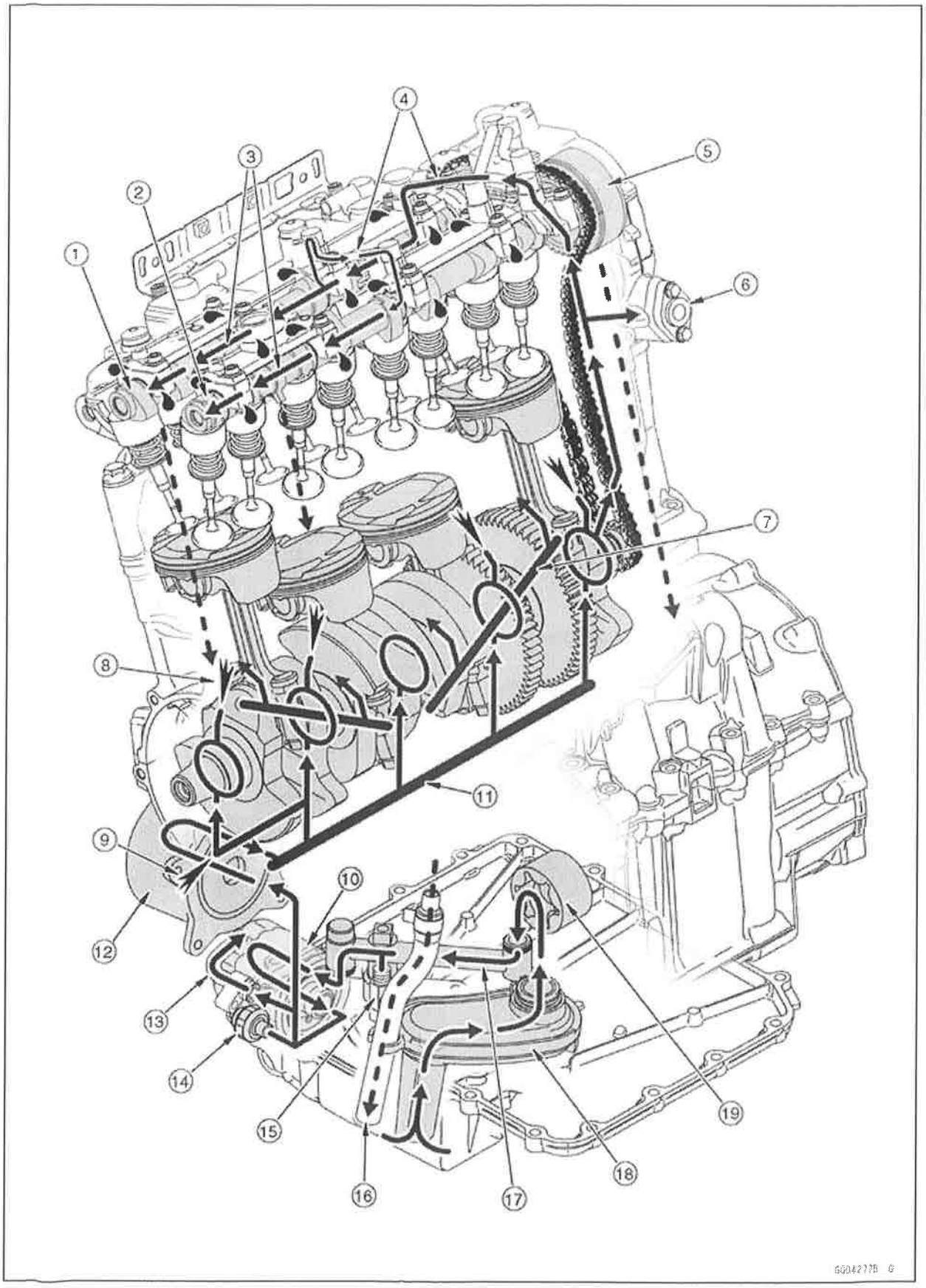
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Control Solenoid Valve Bolts	9.8	1.0	87 in·lb	
2	Oil Pipe Bolt (Upper)	9.8	1.0	87 in·lb	
3	Oil Pump Cover Bolts	9.8	1.0	87 in·lb	
4	Oil Pipe Bolt (Lower)	9.8	1.0	87 in·lb	L
5	Oil Cooler Mounting Bolts (ZG1400EF ~ EG)	12	1.2	106 in·lb	S
	Oil Cooler Mounting Bolts (ZG1400EH)	12	1.2	106 in·lb	L, S
6	Oil Filter	17	1.7	13	G, R
7	Oil Pan Plate Bolts	9.8	1.0	87 in·lb	L
8	Holder Mounting Bolt	35	3.6	26	L
9	Oil Pressure Relief Valve	15	1.5	11	L
10	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
11	Oil Pressure Switch	15	1.5	11	LG
12	Oil Pan Bolts	9.8	1.0	87 in·lb	
13	Engine Oil Drain Bolt	29	3.0	21	
14	Oil Passage Plug	20	2.0	15	L

15. Oil Screen
16. ZG1400EH

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.
WL: Apply soap water solution rubber lubricant.

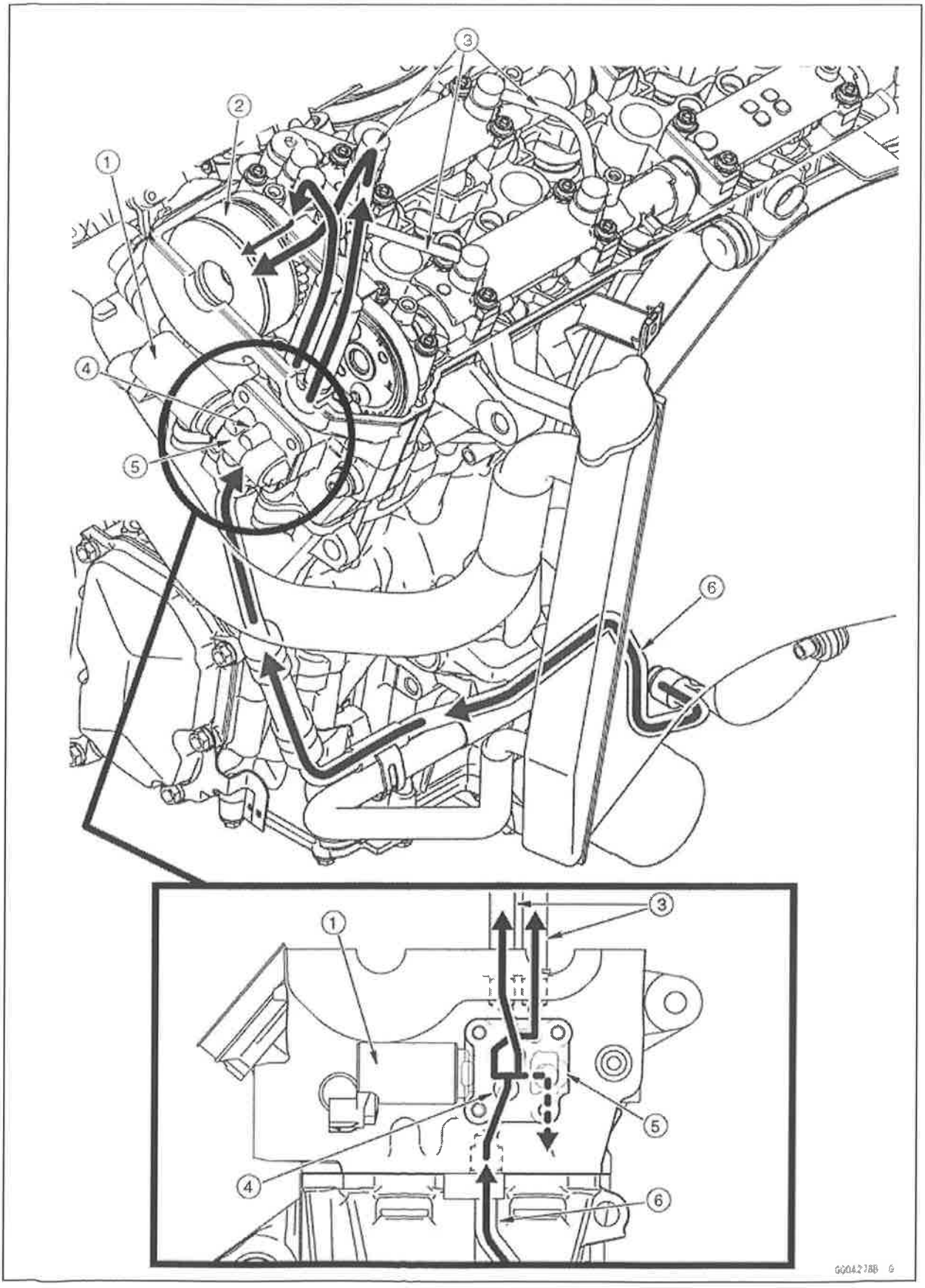
Engine Oil Flow Chart



Engine Oil Flow Chart

1. Exhaust Camshaft
2. Intake Camshaft
3. Camshaft Oil Passage
4. Oil Pipes
5. Variable Valve Timing Actuator
6. Camshaft Chain Tensioner
7. Crankshaft Oil Passage
8. Oil Jet
9. to Alternator
10. Oil Filter
11. Main Oil Passage
12. Oil Cooler
13. Oil Pipe for Variable Valve Timing Actuator
14. Oil Pressure Switch
15. Relief Valve
16. Breather Hose for Return
17. Oil Pipe
18. Oil Screen
19. Oil Pump

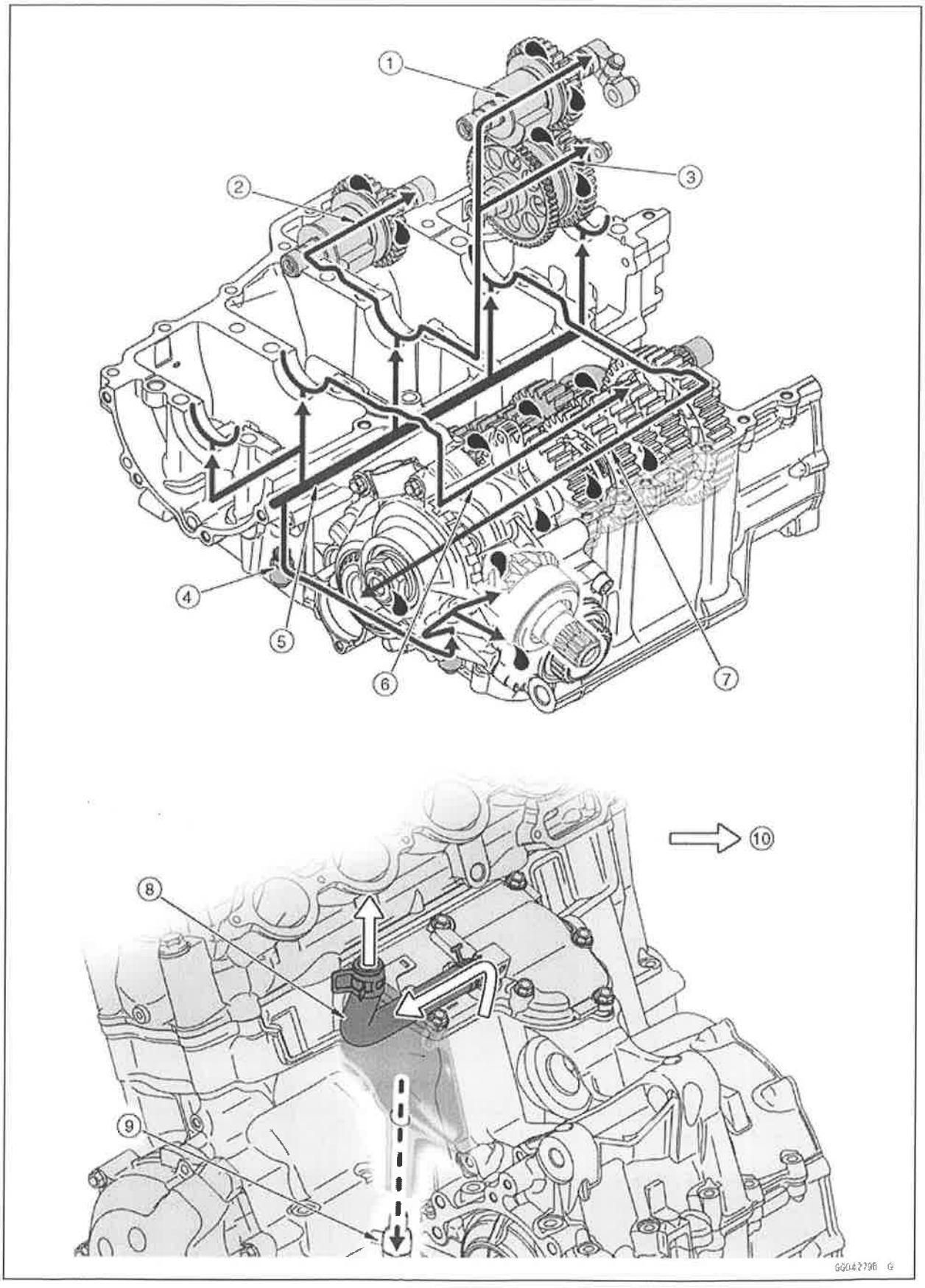
Engine Oil Flow Chart



Engine Oil Flow Chart

1. Oil Control Solenoid Valve
2. Variable Valve Timing Actuator
3. Oil Pipes
4. Oil Screen
5. Oil Control Valve
6. Oil Pipe

Engine Oil Flow Chart



Engine Oil Flow Chart

1. Rear Balancer Oil Passage
2. Front Balancer Oil Passage
3. Starter Motor Clutch Oil Passage
4. Oil Pipe
5. Main Oil Passage
6. Drive Shaft Oil Passage
7. Output Shaft Oil Passage
8. Breather Hose
9. Breather Hose for Return
10. Blowby Gas

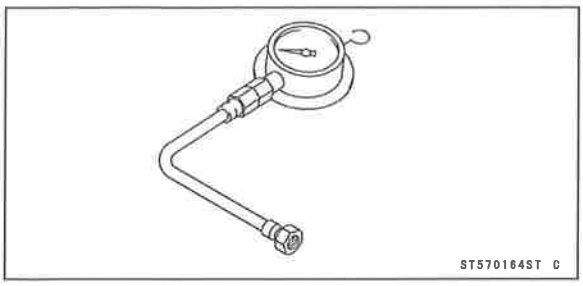
7-10 ENGINE LUBRICATION SYSTEM

Specifications

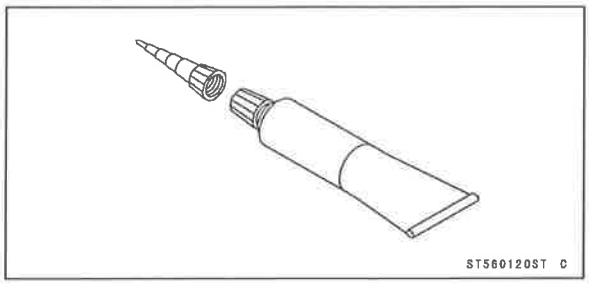
Item	Standard
Engine Oil	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	4.0 L (4.2 US qt) (when filter is not removed)
	4.4 L (4.7 US qt) (when filter is removed)
	4.7 L (5.0 US qt) (when engine is completely dry)
Level	Between upper and lower level lines (Wait several minutes after idling or running)
Oil Pressure Measurement	
Oil Pressure	245 ~ 343 kPa (2.50 ~ 3.50 kgf/cm², 35.5 ~ 49.7 psi) @4 000 r/min (rpm), Oil Temperature 90°C (194°F)

Special Tools and Sealants

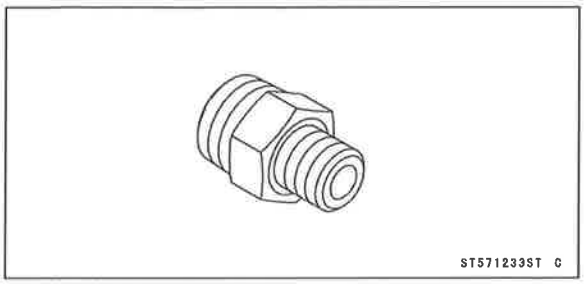
Oil Pressure Gauge, 10 kgf/cm²:
57001-164



Liquid Gasket, TB1211:
56019-120



Oil Pressure Gauge Adapter, PT3/8:
57001-1233



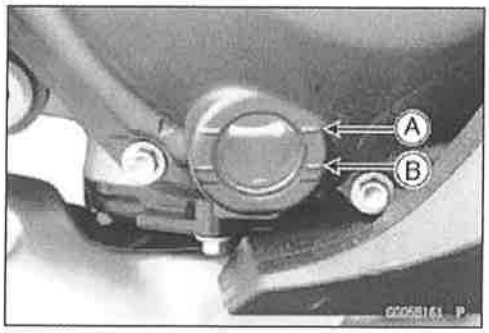
Engine Oil and Oil Filter

⚠ WARNING

Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

Oil Level Inspection

- Check that the engine oil level is between the upper [A] and lower [B] levels in the oil level inspection window.



NOTE

○*Situate the motorcycle so that it is perpendicular to the ground.*

○*If the motorcycle has just been used, wait several minutes for all the oil to drain down.*

○*If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.*

NOTICE

Racing the engine before the oil reaches every part can cause engine seizure.
If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the oil pressure warning light will light. If this light stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.

★If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

NOTE

○*If the engine oil type and make are unknown, use any brand of the specified oil to top off the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.*

Engine Oil Change

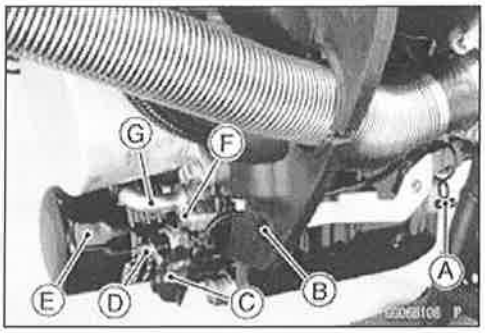
- Refer to the Engine Oil Change in the Periodic Maintenance chapter.

Oil Filter Replacement

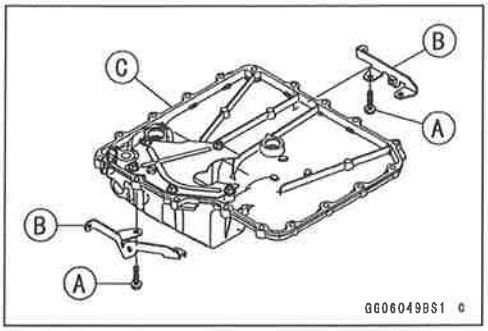
- Refer to the Oil Filter Replacement in the Periodic Maintenance chapter.

Oil Pan

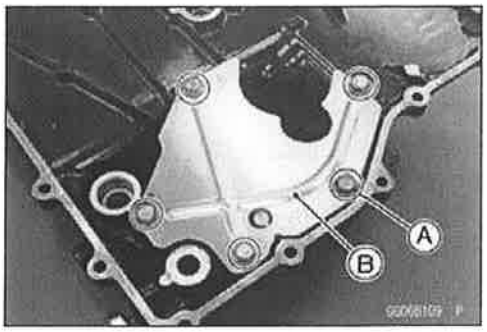
Oil Pan Removal



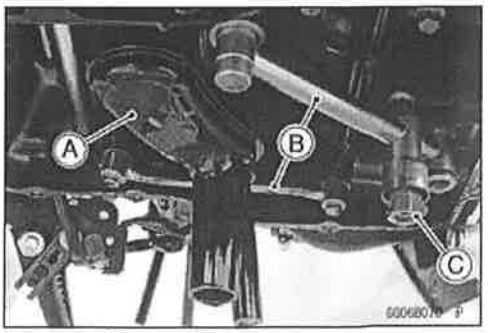
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  Muffler Body (see Muffler Body Removal/Installation in the Engine Top End chapter)
  Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
  Clamp [A]
  Quick Rivet [B] (Both Sides)
- Slide the rubber boot [C].
- Loosen the switch terminal bolt [D] and disconnect the switch lead.
- Remove the oil filter [E] (see Oil Filter Replacement in the Periodic Maintenance chapter).
- Remove the oil pipe bolt [F], and pull out the pipe fitting [G].



- Remove:
  Oil Pan Bolts [A]
  Brackets [B]
  Oil Pan [C]
  Oil Pan Gasket



- Remove:
  Oil Pan Plate Bolts [A]
  Oil Pan Plate [B]



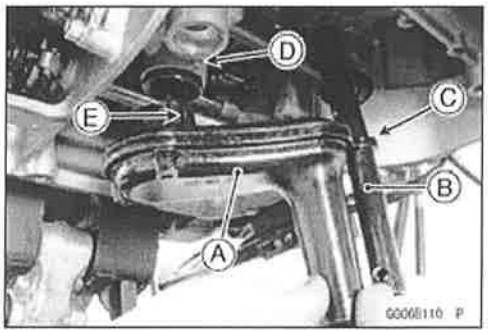
- Remove:
  Oil Screen [A]
  Oil Pipes [B]
  Oil Pressure Relief Valve [C] (If necessary, see Oil Pressure Relief Valve Removal)

NOTICE

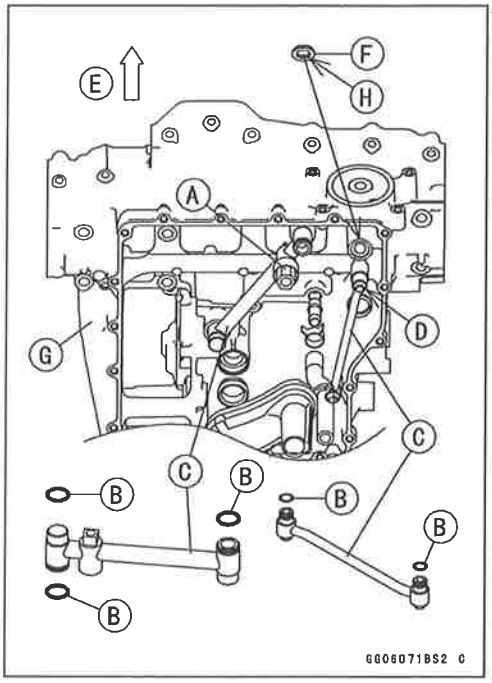
Do not remove the relief valve with the oil pipe installed on the lower crankcase half. The oil pipe will be damaged.

Oil Pan

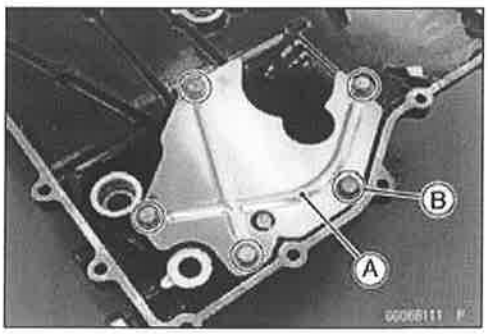
Oil Pan Installation



- Install the breather hose and clamp if removed.
  - Install the breather hose so that the hole side to the oil pan.
  - Install the clamp so that the knob faces to the forward.
- Clean the oil screen [A].
- Through the breather hose [B] to the clamp [C].
- Install the oil screen so that the crankcase rib [D] fits the notch [E] of the oil screen.

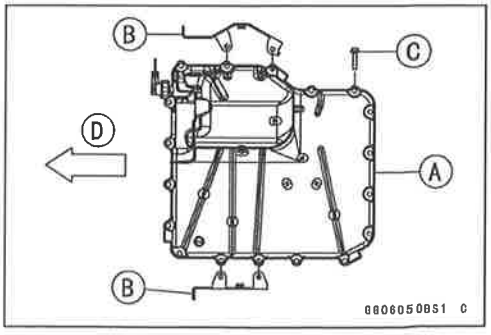


- Install the oil pressure relief valve [A] (see Oil Pressure Relief Valve Installation).
- Replace the O-rings with new ones.
- Apply grease to the oil pipe O-rings [B] and install the oil pipes [C].
  - Install the oil pipe so that the paint side [D] faces front [E].
- Put new O-ring [F] on the lower crankcase [G] as shown.
  - Fit on the O-ring so that the flat surfaces [H] side in.



- Install the oil pan plate [A].
- Apply a non-permanent locking agent to the threads of the oil pan plate bolts [B], and tighten them.

Torque - Oil Pan Plate Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



- Replace the oil pan gasket with a new one.
- Install:
  - Oil Pan Gasket
  - Oil Pan [A]
  - Brackets [B]
- Tighten:

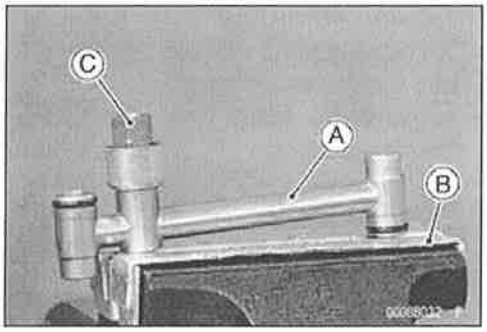
Torque - Oil Pan Bolts [C]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Front [D]

- Install the removed parts (see appropriate chapters).

Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal



- Remove the oil pipe [A] (see Oil Pan Removal).
- Hold the oil pipe in a vise [B].
- Remove the oil pressure relief valve [C].

Oil Pressure Relief Valve Installation

- Apply a non-permanent locking agent to the threads of the oil pressure relief valve, and tighten it.

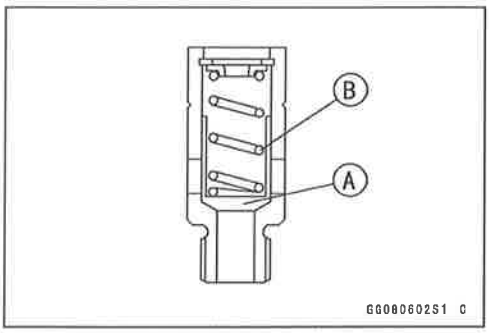
NOTICE

Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Install the removed parts (see appropriate chapters).

Oil Pressure Relief Valve Inspection



- Remove the oil pressure relief valve (see Oil Pressure Relief Valve Removal).
- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.

NOTE

○*Inspect the valve in its assembled state. Disassembly and assembly may change the valve performance.*

★If any rough spots are found during above inspection, wash the valve clean with a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.

⚠ WARNING

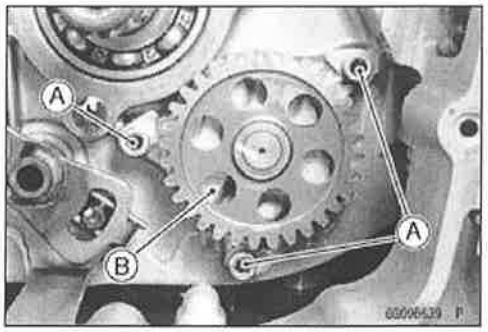
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the oil pressure relief valve.

★If cleaning does not solve the problem, replace the oil pressure relief valve as an assembly. The oil pressure relief valve is precision made with no allowance for replacement of individual parts.

Oil Pump

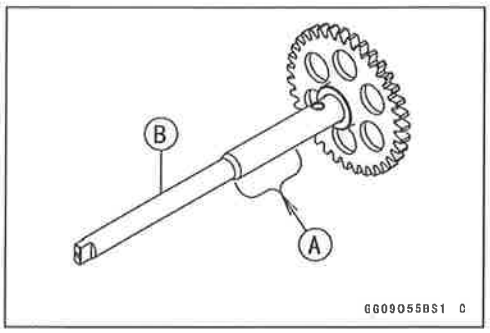
Oil Pump Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the clutch (see Clutch Removal in the Clutch chapter).
- Remove the oil pump cover bolts [A].
- Remove the oil pump cover [B] with oil pump drive gear shaft.
- Remove the outer rotor and inner rotor.

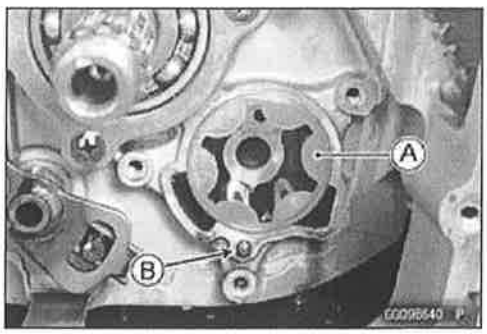


Oil Pump Installation

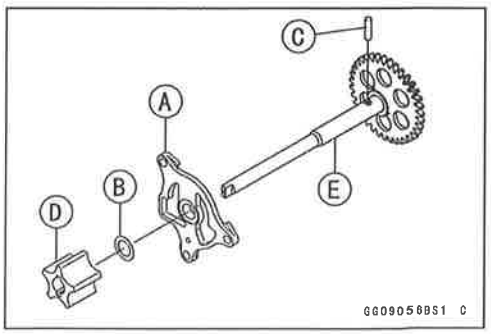
- Apply molybdenum disulfide oil solution to the journal portion [A] on the oil pump drive gear shaft [B].



- Install the outer rotor [A] and the dowel pin [B] into the crankcase.



- Install the pump cover [A], washer [B], pin [C] and inner rotor [D] to the oil pump drive gear shaft [E].



Oil Pump

- Install the oil pump drive gear shaft with inner rotor.

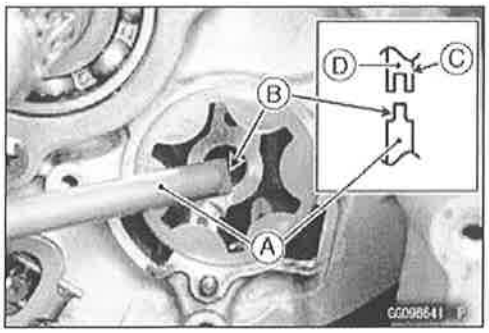
○Turn the oil pump drive gear shaft [A] so that the projection [B] of the shaft fits onto the slot [C] of the water pump shaft [D].

○Fit the hole of the oil pump cover onto the pin on the crankcase.

- Tighten:

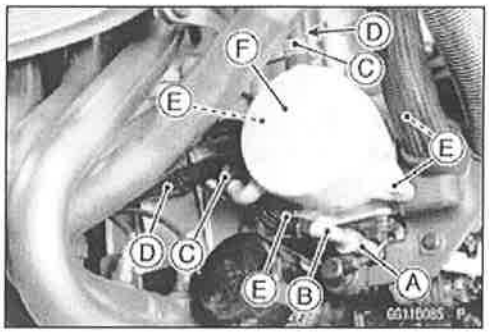
Torque - Oil Pump Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).



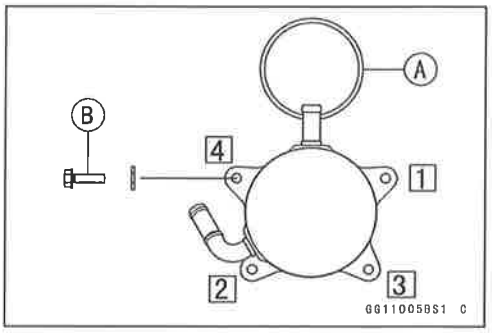
Oil Cooler

Oil Cooler Removal



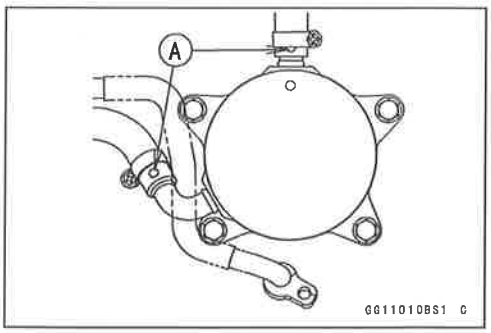
- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Left Front Middle Fairing (see Front Middle Fairing Removal in the Frame chapter)
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Oil Pipe Bolt [A]
- Pull out the pipe fitting [B].
- Slide the clamps [C].
- Disconnect the water hoses [D].
- Remove the oil cooler mounting bolts [E], and oil cooler [F].

Oil Cooler Installation



- Replace the O-ring [A] with a new one.
- For ZG1400EH, apply a non-permanent locking agent to the threads of the oil coder mounting bolts.
- Install the oil cooler, and tighten the bolts following the specified tightening sequence [1 ~ 4].

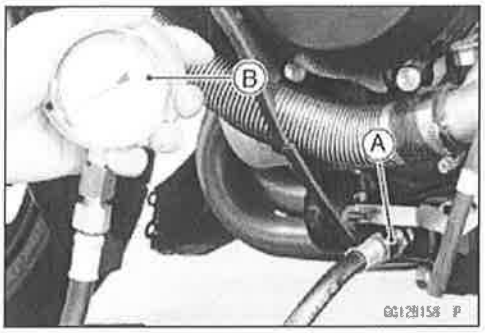
Torque - Oil Cooler Mounting Bolts [B]: 12 N·m (1.2 kgf·m, 106 in·lb)



- Install the water hoses as shown.
  Marks [A]
- Install the removed parts (see appropriate chapters).

Oil Pressure Measurement

Oil Pressure Measurement



- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Remove the oil passage plug, and attach the adapter [A] and gauge [B] to the plug hole.

Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164
Oil Pressure Gauge Adapter, PT3/8: 57001 -1233

- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.

★If the oil pressure is much lower than the standard, check the oil pump, relief valve, and/or crankshaft bearing insert wear immediately.

★If the reading is much higher than the standard, check the oil passages for clogging.

Oil Pressure
Standard: 245 ~ 343 kPa (2.50 ~ 3.50 kgf/cm², 35.5 ~ 49.7 psi) @4 000 r/min (rpm), oil temperature 90°C (194°F)

- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

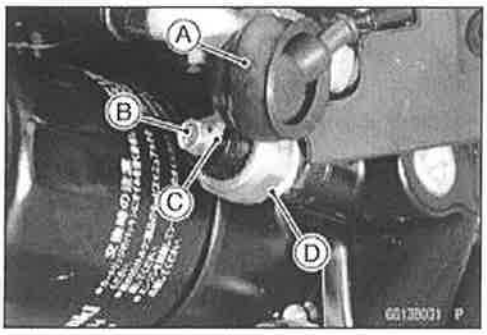
Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Apply a non-permanent locking agent to the threads of the oil passage plug, and tighten it.

Torque - Oil Passage Plug: 20 N·m (2.0 kgf·m, 15 ft·lb)

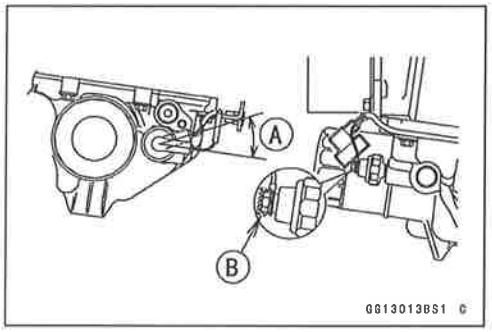
Oil Pressure Switch

Oil Pressure Switch Removal



- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Rubber Boot [A]
- Loosen the oil pressure switch terminal bolt [B] and disconnect the switch lead [C].
- Remove the oil pressure switch [D].

Oil Pressure Switch Installation



- Apply liquid gasket to the threads of the oil pressure switch and tighten it.

Sealant - Liquid Gasket, TB1211: 56019-120

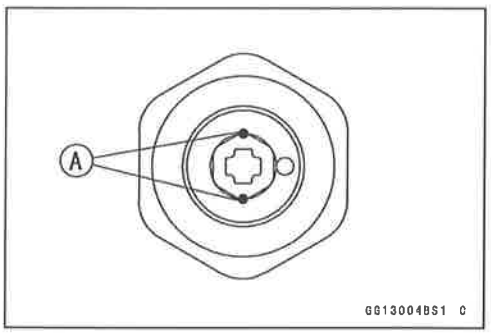
Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Install the switch lead so that its direction [A] is as shown.
- Apply grease [B] to the terminal.
- Tighten the terminal bolt.

Torque - Oil Pressure Switch Terminal Bolt: 1.5 N·m (0.15 kgf·m, 13 in·lb)

NOTE

○*Apply a small amount grease to the terminal so that grease should not close two breather holes [A] for switch diaphragm.*

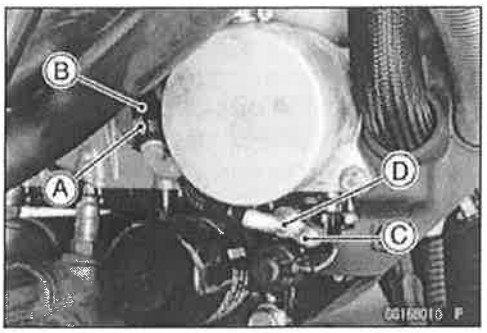


VVT (Variable Valve Timing)

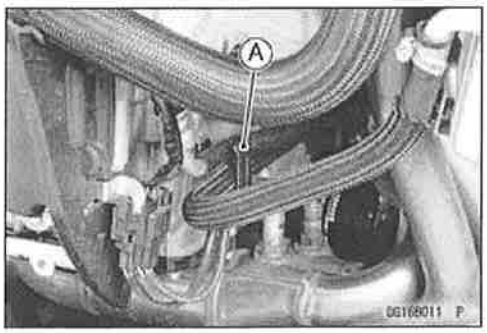
Oil Pipe Removal

- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  Front Middle Fairings (see Front Middle Fairing Removal in the Frame chapter)
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)

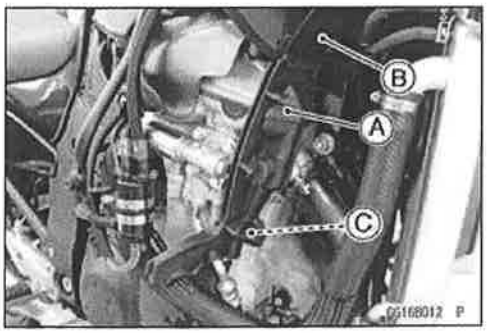
- Slide the clamp [A] and disconnect the water hose [B].
- Remove the oil pipe bolt (lower) [C] and pull out the pipe fitting [D].



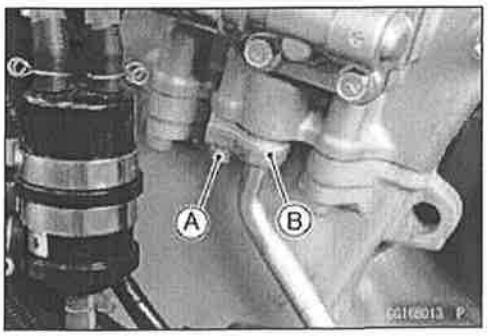
- Open the clamp [A].



- Remove the right inner rubber cover [A] from the radiator cover [B].
- Pull out the projection [C] of the right inner rubber cover.



- Remove the oil pipe bolt (upper) [A], and pull out the pipe fitting [B].
- Remove the oil pipe.



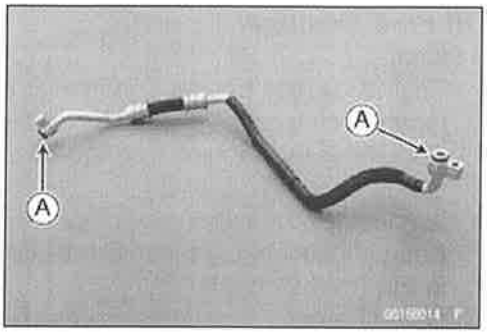
VVT (Variable Valve Timing)

Oil Pipe Installation

- Replace the oil pipe O-rings [A] with new ones.
- Apply grease to the oil pipe O-rings.
- Run the oil pipe correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Apply a non-permanent locking agent to the oil pipe bolt (lower).
- Tighten:

Torque - Oil Pipe Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).

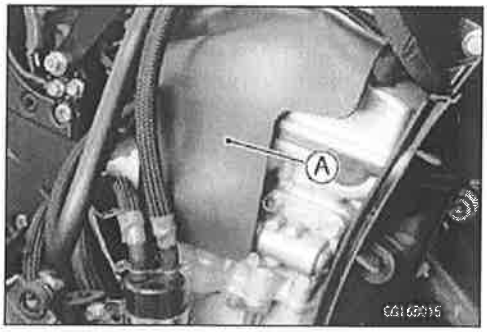


Oil Control Solenoid Valve Removal

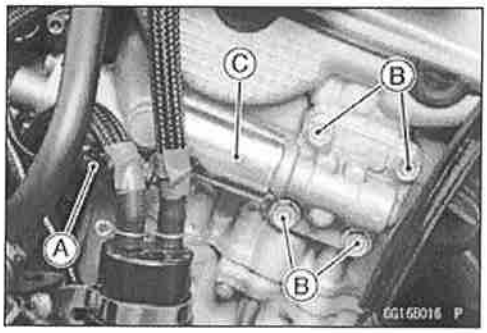
NOTICE

Never drop the oil control solenoid valve, especially on a hard surface. Such a shock to the oil control solenoid valve can damage it.

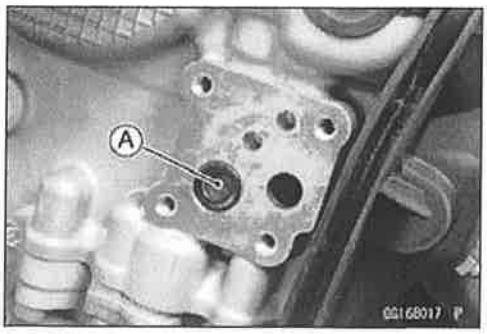
- Remove the right rear middle fairing (see Rear Middle Fairing Removal in the Frame chapter).
- Turn up the rubber cover [A].



- Disconnect the connector [A].
- Remove:
  Oil Control Solenoid Valve Bolts [B]
  Oil Control Solenoid Valve [C]
  Gasket



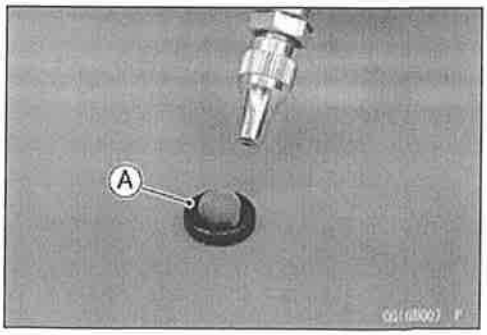
- Remove the oil screen [A].



Oil Control Solenoid Valve Installation

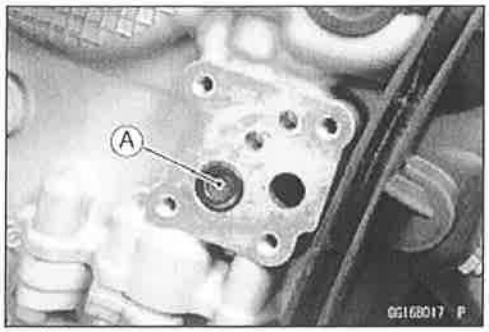
- Clean the oil screen [A] with compressed air.
- Check the oil screen carefully for any damage: holes, broken wires, and abnormal wear.

★If the oil screen is damaged, replace it.



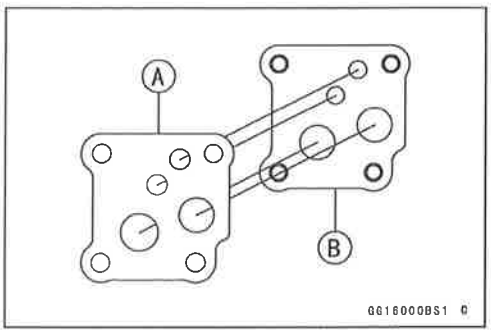
VVT (Variable Valve Timing)

- Install the oil screen [A].



- Replace the gasket with a new one.
- Install the gasket [A] as shown.
  Cylinder Head Mating Surface [B]
- Install the oil control solenoid valve.
- Tighten:

Torque - Oil Control Solenoid Valve Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Variable Valve Timing Actuator Removal/Installation

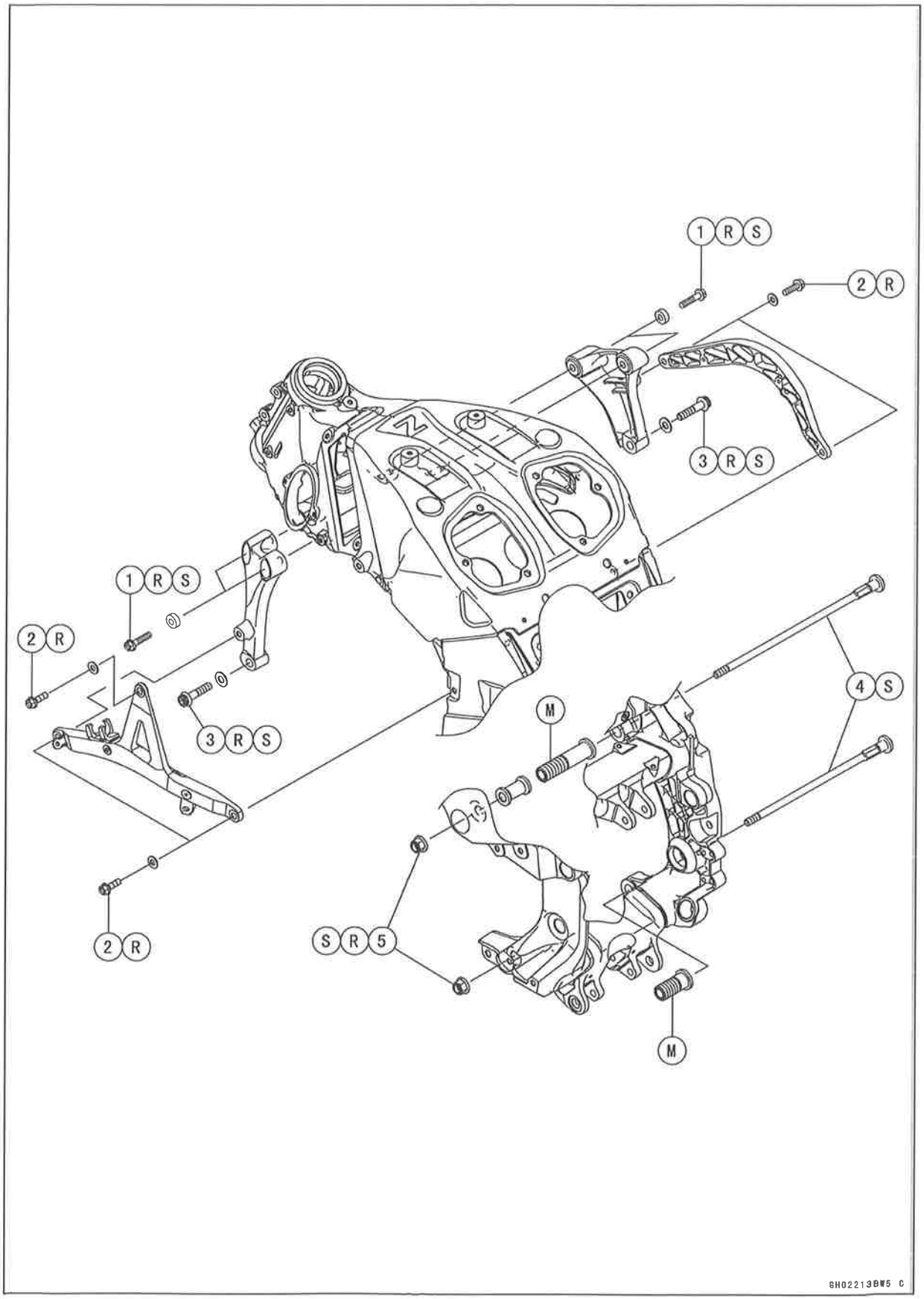
- Refer to the Camshaft Removal and Camshaft Installation in the Engine Top End chapter.

Engine Removal/Installation

Table of Contents

Exploded View 8-2
Engine Removal/Installation 8-4
Engine Removal 8-4
Engine Installation 8-10

Exploded View



Exploded View

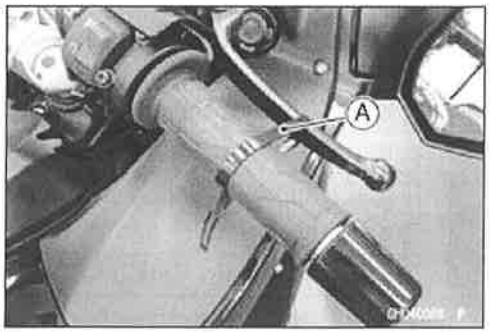
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Bracket Bolts (M8)	25	2.5	18	R, S
2	Subframe Bolts	23	2.3	17	R
3	Front Engine Mounting Bolts (M10)	60	6.1	44	R, S
4	Engine Mounting Bolts	15	1.5	11	S
5	Engine Mounting Nuts (M12)	60	6.1	44	R, S

M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

Engine Removal/Installation

Engine Removal

- Use the center stand to support the motorcycle upright.
- Squeeze the brake lever slowly and hold it with a band [A].



⚠ WARNING

Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the engine.

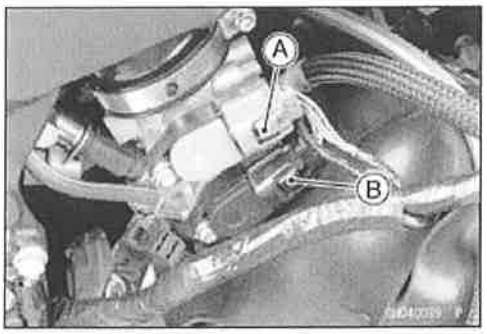
NOTICE

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

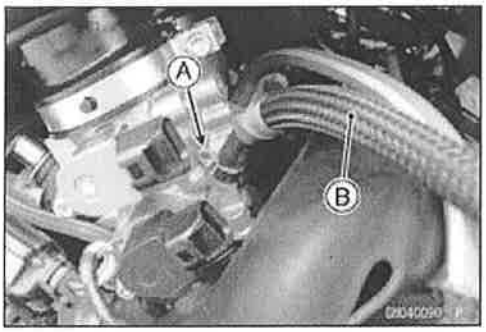
- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  Middle Fairings (see Front/Rear Middle Fairing Removal in the Frame chapter)
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Air Cleaner Caps (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Fairing Stays (see Right/Left Fairing Stay Removal in the Frame chapter)
  Subframes (see Left/Right Subframe Removal in the Frame chapter)
  Coolant Reserve Tank (see Coolant Reserve Tank Removal in the Cooling System chapter)
  Left Inner Rubber Cover (see Left Inner Rubber Cover Removal in the Frame chapter)
  Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
  Muffler Body (see Muffler Body Removal in the Engine Top End chapter)
  Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
  Air Switching Valve (see Air Switching Valve Removal in the Engine Top End chapter)

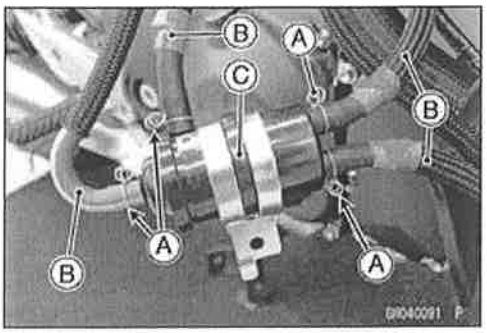
Engine Removal/Installation

- Disconnect:
  Subthrottle Sensor Connector [A]
  Main Throttle Sensor Connector [B]

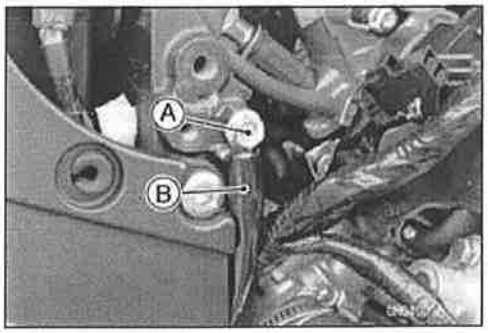


- For evaporative emission control system equipped models; note the following.
- Slide the clamps [A] and disconnect the hoses [B].
- Remove:
  Separator [C]
  Canister with the hoses

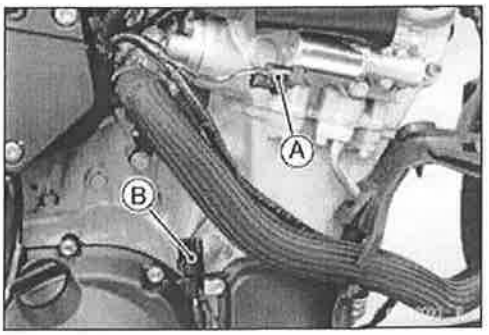




- Remove the ground bolt [A] and free the cable [B].

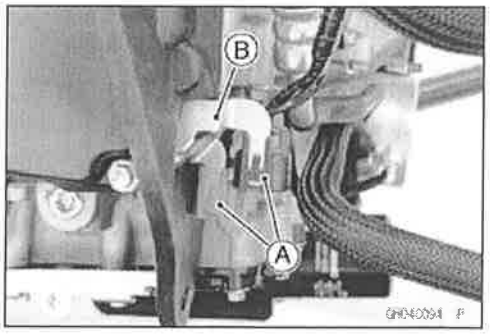


- Disconnect:
  Oil Control Solenoid Valve Connector [A]
  Crankshaft Sensor Lead Connector [B]

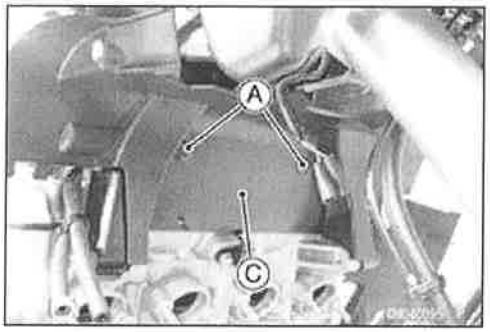


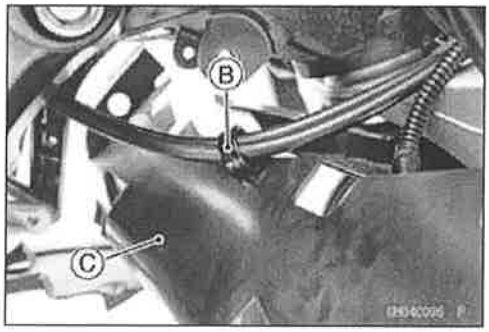
Engine Removal/Installation

- Remove the oxygen sensor connectors [A] from the bracket [B].

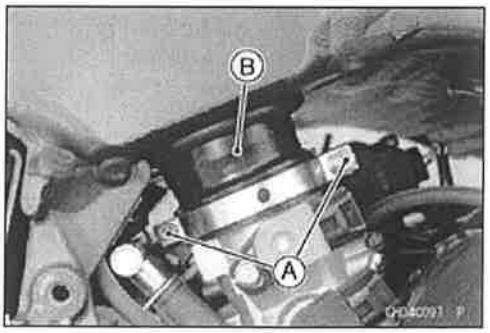


- Remove:
  Quick Rivets [A]
  Clamp [B]
  Radiator Cover [C]

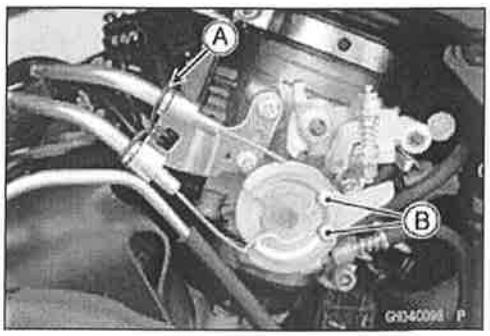




- Loosen the duct clamp bolts [A] on both sides.
- Pull up the ducts [B] upward.

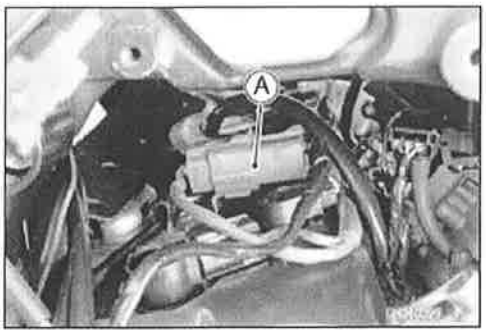


- Remove:
  Clamp [A]
  Throttle Cable Lower Ends [B] (see Throttle Body Assy Removal in the Fuel System chapter)

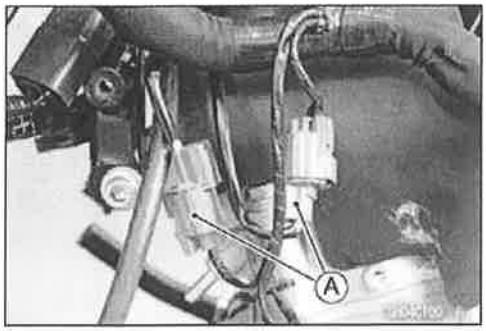


Engine Removal/Installation

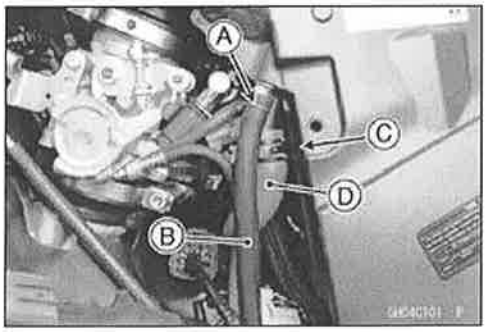
- Disconnect the connector [A].



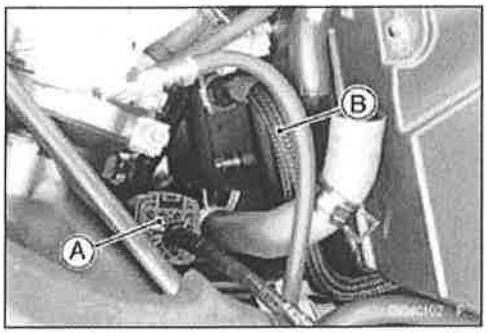
- Disconnect the camshaft position sensor lead connectors [A].



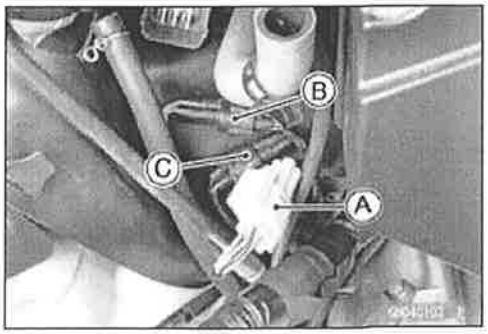
- Slide the clamp [A] and disconnect the air cleaner drain hose [B].
- Slide the clamp [C] and disconnect the breather hose [D].



- Disconnect:
  Throttle Body Subharness Connector [A]
  Fuel Hose [B] (see Fuel Hose Replacement in the Periodic Maintenance chapter)

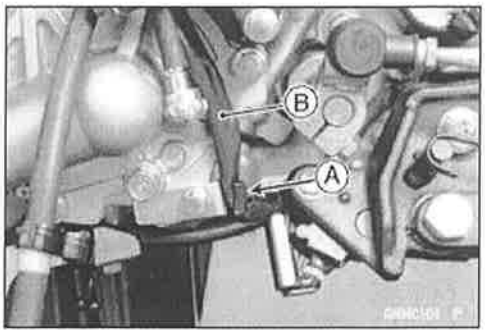


- Disconnect:
  Gear Position Switch Lead Connector [A]
  Speed Sensor Lead Connector [B]
  Side Stand Switch Lead Connector [C]

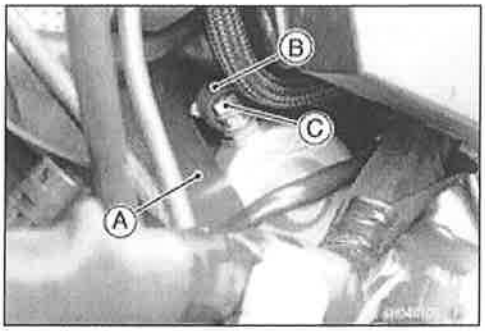


Engine Removal/Installation

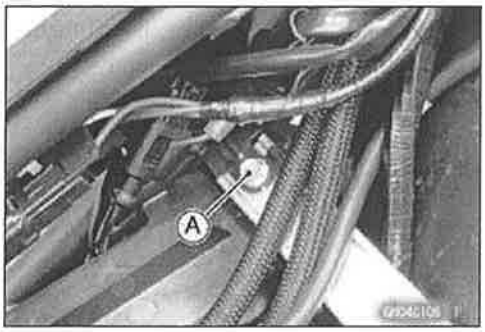
- Open the clamp [A] and free the side stand switch lead [B].



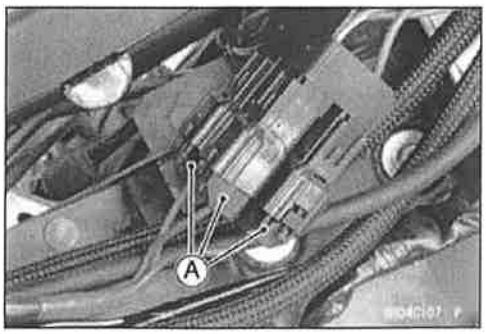
- Take off the heat insulation rubber plate [A].
- Slide out the rubber cap [B].
- Remove the starter motor cable terminal nut [C].



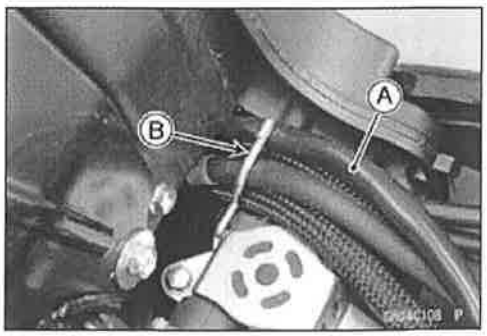
- Remove the Bolt [A].



- Disconnect the alternator lead connectors [A].

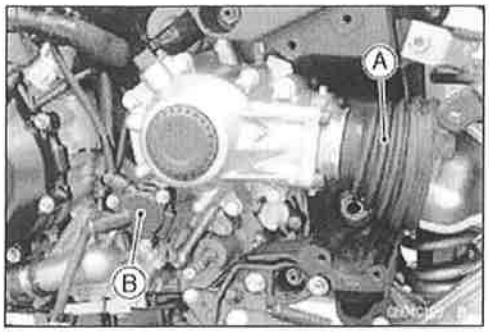


- Free the alternator lead [A] from the bracket [B].



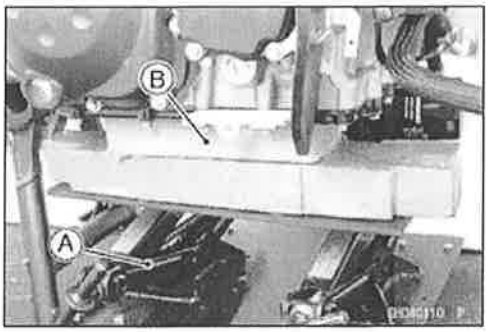
Engine Removal/Installation

- Remove:
  Propeller Shaft (see Propeller Shaft Removal in the Final Drive chapter)
  Rubber Boot [A]
  Clutch Slave Cylinder [B] (see Clutch Slave Cylinder Removal in the Clutch chapter)

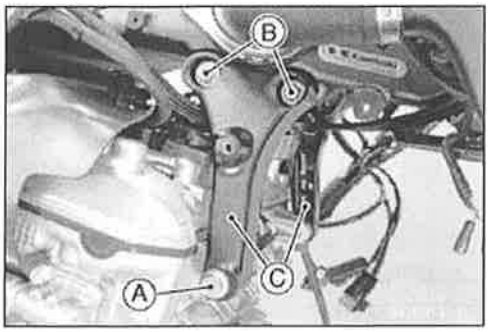


- Support the engine with a suitable stand [A].

○Put a plank [B] onto the suitable stand for engine balance.



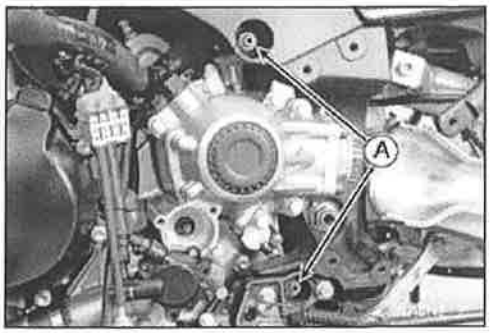
- Remove:
  Front Engine Mounting Bolt (M10) [A] (Both Sides)
  Engine Bracket Bolts (M8) [B] (Both Sides)
  Engine Brackets [C]



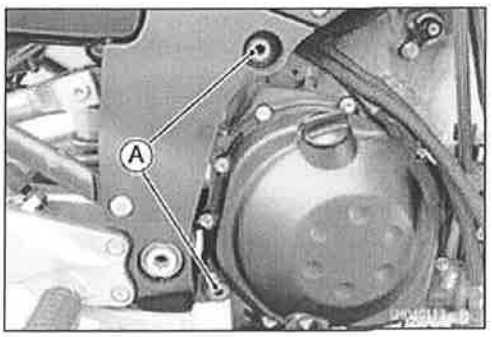
- Remove:
  Engine Mounting Nuts (M12) [A]

NOTE

○*Hold the mounting bolts at the right side of the frame when loosening the engine mounting nuts at the left side of the frame.*



- Using a hexagon wrench, turn the engine mounting bolts [A] clockwise to make the gap between the adjusting collar and frame.
- Remove:
  Engine Mounting Bolts
  Collar
- Using the stand, remove the engine.



Engine Removal/Installation

Engine Installation

- Support the engine with a suitable stand.

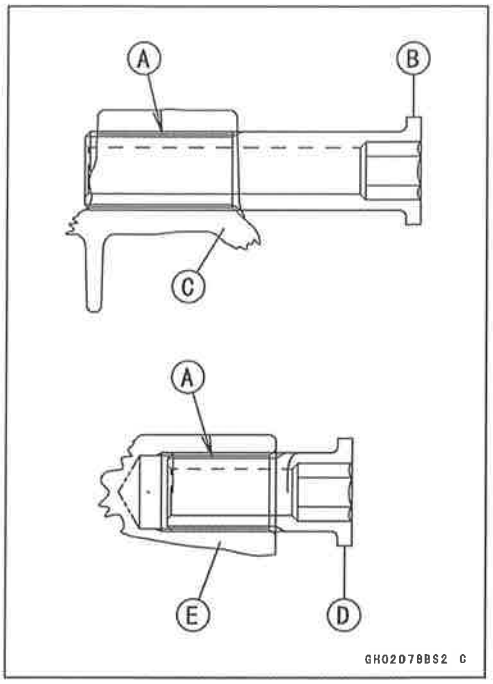
○Put a plank onto the suitable stand for engine balance.

- Install the heat insulation cover and run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

- Install the engine mounting bolts and nuts, following the specified installing sequence.

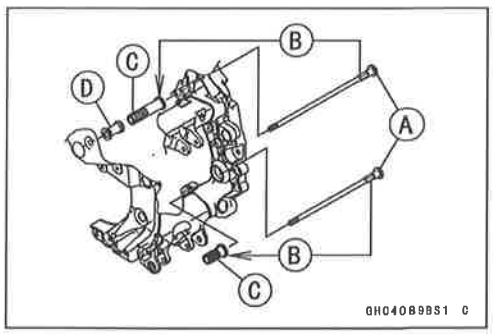
○Apply molybdenum disulfide grease [A] to the thread of adjusting collars.

○First, tighten the adjusting collars fully by hand.
Upper Adjusting Collar [B]
Upper Crankcase [C]
Lower Adjusting Collar [D]
Lower Crankcase [E]



○Secondly, insert the engine mounting bolts [A] until they fit [B] in the adjusting collars [C].

○Be sure that the collar [D] is in position.

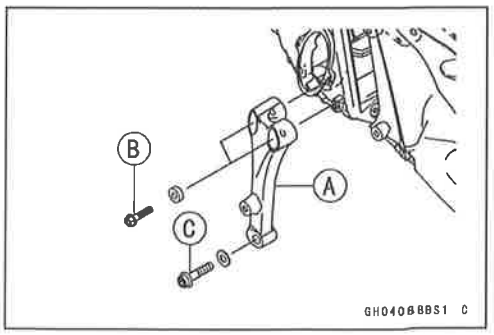


NOTE

○*Replace the following bolts with new bolts pre-coated with locking agent.*

Engine Bracket Bolts (M8) (P/No. 92153-1770)
Front Engine Mounting Bolts (M10) (P/No. 92153-1769)
Subframe Bolts (P/No. 92153-1768)

○Thirdly, install the left engine bracket [A] and temporary tighten the left engine bracket bolts [B] and left front engine mounting bolt [C].



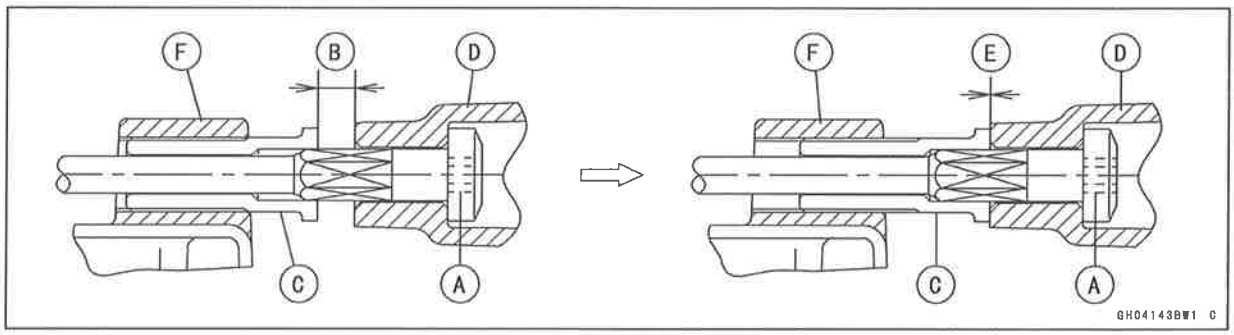
Engine Removal/Installation

○Fourthly, turn the engine mounting bolts [A] counterclockwise with specified torque until the clearance [B] between the adjusting collars [C] and frame [D] comes to zero mm [E].
Crankcase [F]

○At this time, prevent the weight load from hanging to the engine mounting bolts by supporting the engine with the stand.

Torque - Engine Mounting Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)

○Do not exceed the specified torque of the engine mounting bolts .



Engine Removal/Installation

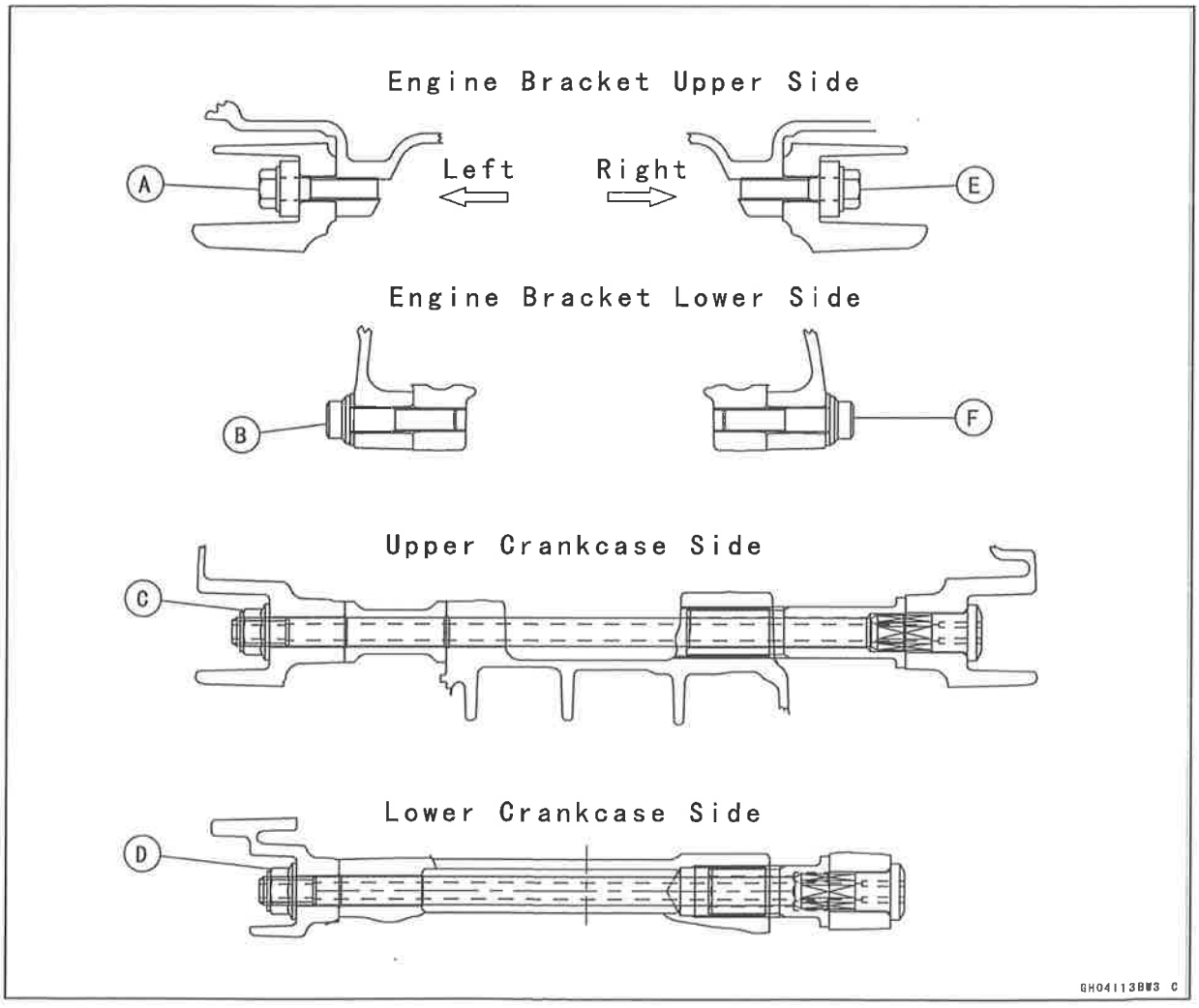
OFifthly, tighten the left engine bracket bolts [A] and left front engine mounting bolt [B].
OReplace the engine mounting nuts [C] [D] with new ones.
OSixthly, tighten the upper engine mounting nut and then the lower engine mounting nut.

NOTE

OHold the mounting bolts at the right side of the frame when tightening the engine mounting nuts at the left side of the frame.

OSeventhly, install the right engine bracket and tighten the right engine bracket bolts [E] and the right front engine mounting bolt [F].
OTighten:

Torque - Engine Mounting Nut (M12): 60 N·m (6.1 kgf·m, 44 ft·lb)
Engine Bracket Bolts (M8): 25 N·m (2.5 kgf·m, 18 ft·lb)
Front Engine Mounting Bolts (M10): 60 N·m (6.1 kgf·m, 44 ft·lb)



Engine Removal/Installation

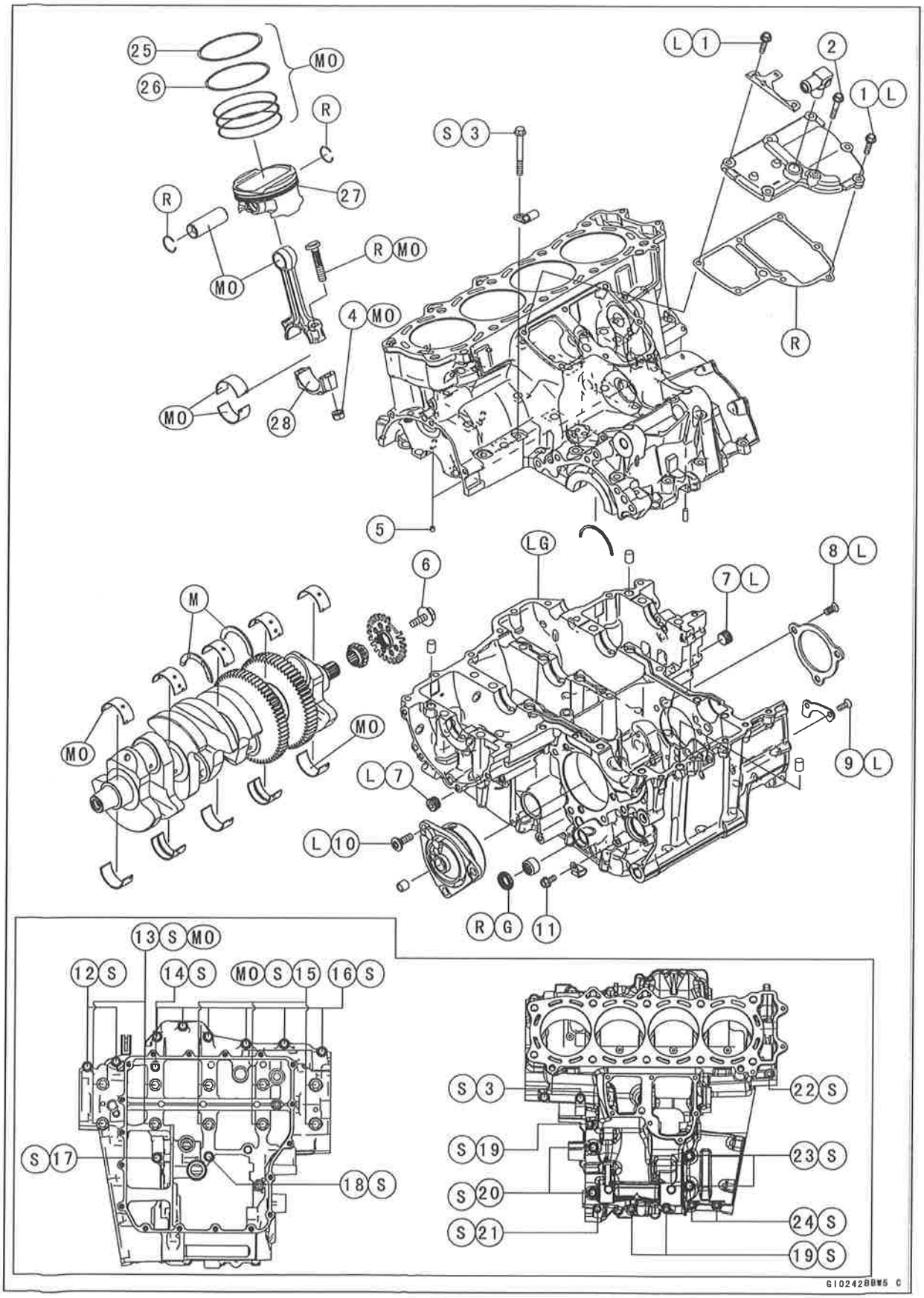
- Run the leads, cable and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:
  Throttle Cables (see Throttle Control System Inspection in the Periodic Maintenance chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the engine with coolant and bleed the air from the cooling system (see Coolant Change in the Periodic Maintenance chapter).

Crankshaft/Transmission

Table of Contents

Exploded View 9-2
Specifications 9-6
Special Tools and Sealant 9-9
Crankcase Splitting 9-10
  Crankcase Splitting 9-10
  Crankcase Assembly 9-12
Crankshaft and Connecting Rods 9-16
  Crankshaft Removal 9-16
  Crankshaft Installation 9-16
  Connecting Rod Removal 9-17
  Connecting Rod Installation 9-17
  Crankshaft/Connecting Rod Cleaning 9-21
  Connecting Rod Bend Inspection 9-21
  Connecting Rod Twist Inspection. 9-21
  Connecting Rod Big End Side Clearance Inspection 9-22
  Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection 9-22
  Crankshaft Side Clearance Inspection 9-24
  Crankshaft Runout Inspection 9-24
  Crankshaft Main Bearing Insert/Journal Wear Inspection . 9-24
Pistons 9-27
  Piston Removal 9-27
  Piston Installation 9-27
  Cylinder Wear (Upper Crankcase) Inspection 9-29
  Piston Wear Inspection 9-29
  Piston Ring, Piston Ring Groove Wear Inspection 9-29
  Piston Ring Groove Width Inspection 9-29
  Piston Ring Thickness Inspection 9-30
  Piston Ring End Gap Inspection .. 9-30
Balancer 9-31
  Front Balancer Removal 9-31
  Front Balancer Installation 9-31
  Rear Balancer Removal 9-32
  Rear Balancer Installation 9-33
  Balancer Adjustment 9-35
  Balancer Damper Inspection 9-35
Starter Clutch and Torque Limiter 9-36
  Starter Clutch Removal 9-36
  Starter Clutch Installation 9-36
  Starter Motor Clutch Disassembly 9-37
  Starter Motor Clutch Assembly 9-37
  Starter Clutch Inspection 9-38
  Torque Limiter Removal 9-38
  Torque Limiter Installation 9-38
External Shift Mechanism 9-39
  Shift Pedal Removal 9-39
  Shift Pedal Installation 9-39
  External Shift Mechanism Removal 9-39
  External Shift Mechanism Installation 9-40
  External Shift Mechanism Inspection 9-41
  Transmission Shaft Removal 9-42
  Transmission Shaft Installation 9-42
  Transmission Shaft Disassembly. 9-43
  Transmission Shaft Assembly 9-43
  Shift Drum and Fork Removal 9-46
  Shift Drum and Fork Installation... 9-46
  Shift Drum Disassembly 9-46
  Shift Drum Assembly 9-47
  Shift Fork Bending Inspection 9-47
  Shift Fork/Gear Groove Wear Inspection 9-47
  Shift Fork Guide Pin/Drum Groove Wear Inspection 9-47
  Gear Dog and Gear Dog Hole Damage Inspection 9-48

Exploded View



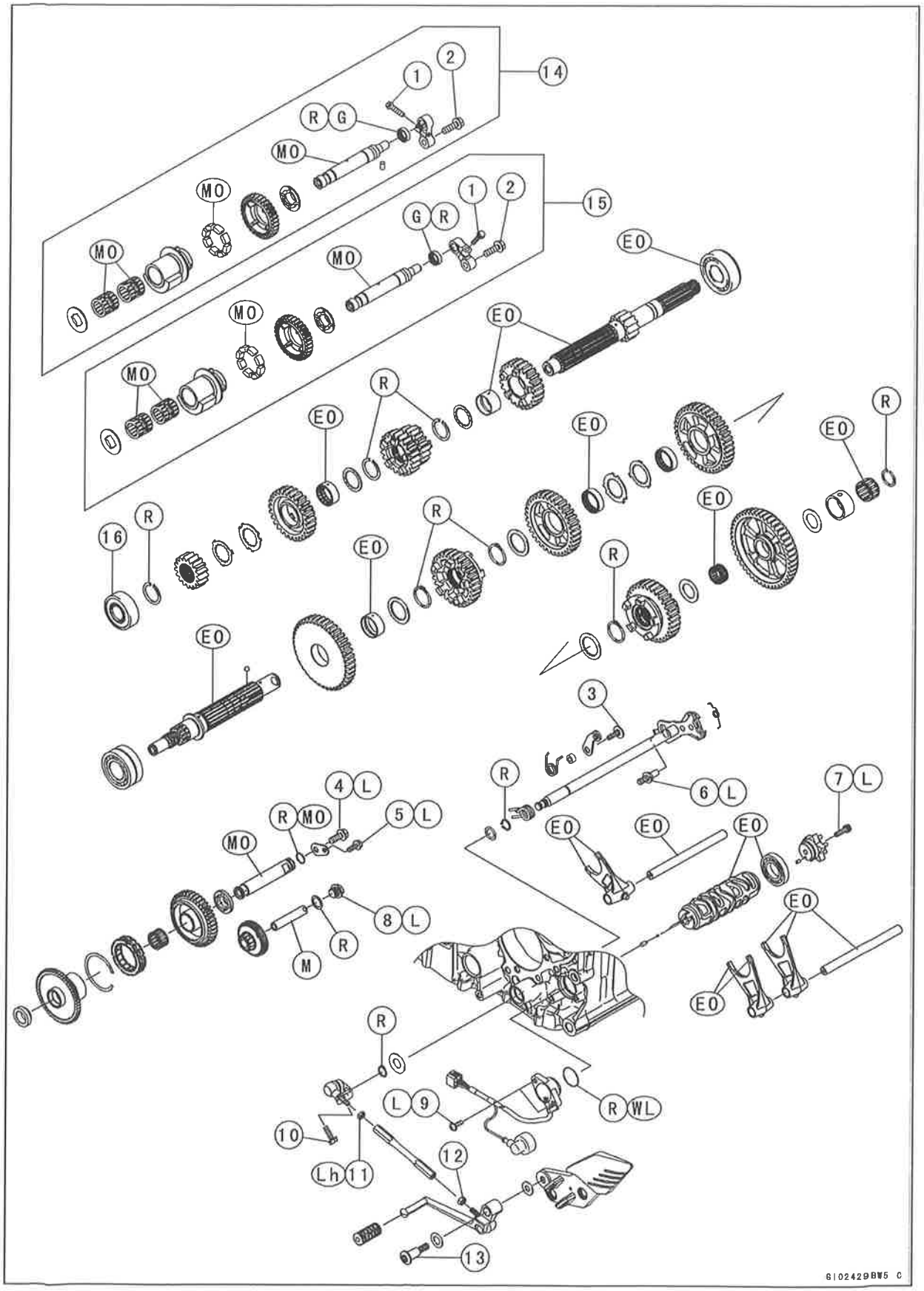
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Breather Cover Bolts (L = 25 mm)	9.8	1.0	87 in·lb	L
2	Breather Cover Bolt (L = 35 mm)	9.8	1.0	87 in·lb	
3	Crankcase Bolts (M7, L = 65 mm)	20	2.0	15	S
4	Connecting Rod Big End Nuts	see the text	←	←	MO
5	Piston Oil Jets	2.9	0.30	26 in·lb	
6	Timing Rotor Bolt	39	4.0	29	
7	Oil Passage Plugs	20	2.0	15	L
8	Bearing Position Plate Bolts	10	1.0	89 in·lb	L
9	Shift Drum Bearing Holder Bolts	10	1.0	89 in·lb	L
10	Drive Shaft Cover Bolts	25	2.5	18	L
11	Gear Position Switch Lead Clamp Bolt	9.8	1.0	87 in·lb	
12	Crankcase Bolts (M7, L = 60 mm)	20	2.0	15	S
13	Crankcase Bolts (M10, L = 120 mm) (Engine No. ~ ZXT40E08970)	47	4.8	35	MO, S
	Crankcase Bolts (M10, L = 120 mm) (Engine No. ZXT40AE08971 ~)	49	5.0	36	MO, S
14	Crankcase Bolt (M7, L = 110 mm)	20	2.0	15	S
15	Crankcase Bolts (M10, L = 90 mm) (Engine No. ~ ZXT40E08970)	47	4.8	35	MO, S
	Crankcase Bolts (M10, L = 90 mm) (Engine No. ZXT40AE08971 ~)	49	5.0	36	MO, S
16	Crankcase Bolts (M7, L = 45 mm)	20	2.0	15	S
17	Crankcase Bolt (M7, L = 50 mm)	20	2.0	15	S
18	Crankcase Bolt (M7, L = 85 mm)	20	2.0	15	S
19	Crankcase Bolts (M6, L = 40 mm)	12	1.2	106 in·lb	S
20	Crankcase Bolts (M8, L = 70 mm)	27	2.8	20	S
21	Crankcase Bolt (M6, L = 50 mm)	12	1.2	106 in·lb	S
22	Crankcase Bolt (M6, L = 65 mm)	12	1.2	106 in·lb	S
23	Crankcase Bolts (M8, L = 80 mm)	27	2.8	20	S
24	Crankcase Bolts (M6, L = 25 mm)	12	1.2	106 in·lb	S

25. "R" marked side faces up.
26. "RN" marked side faces up.
27. "IN" mark faces to intake side (rearward).
28. Do not apply any grease or oil.

G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10 : 1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Balancer Shaft Clamp Bolts	9.8	1.0	87 in·lb	
2	Balancer Shaft Clamp Lever Bolts	25	2.5	18	
3	Gear Positioning Lever Bolt	12	1.2	106 in·lb	
4	Starter Clutch Shaft Bolt	9.8	1.0	87 in·lb	L
5	Starter Clutch Shaft Plate Bolt	9.8	1.0	87 in·lb	L
6	Shift Shaft Return Spring Pin	29	3.0	21	L
7	Shift Drum Cam Holder Bolt	12	1.2	106 in·lb	L
8	Torque Limiter Bolt	25	2.5	18	L
9	Gear Position Switch Screws	2.9	0.30	26 in·lb	L
10	Shift Lever Bolt	8.0	0.82	71 in·lb	
11	Tie-rod Locknut (Front)	6.9	0.70	61 in·lb	Lh
12	Tie-rod Locknut (Rear)	6.9	0.70	61 in·lb	
13	Shift Pedal Mounting Bolt	25	2.5	18	

14. Front Balancer
15. Rear Balancer
16. Install the bearing into the drive shaft cover so that the shield side faces in.

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
Lh: Left-hand threads
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10 : 1)
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Specifications

Item	Standard	Service Limit
Crankcase, Crankshaft/Connecting Rods		
Connecting Rod Bend	– – –	TIR 0.2/100mm (0.008/3.94 in.)
Connecting Rod Twist	– – –	TIR 0.2/100mm (0.008/3.94 in.)
Connecting Rod Big End Side Clearance	0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)	0.6 mm (0.02 in.)
Connecting Rod Big End Bearing Insert/Crankpin Clearance	0.048 ~ 0.086 mm (0.0019 ~ 0.0034 in.)	0.12 mm (0.0047 in.)
Crankpin Diameter:	37.984 ~ 38.000 mm (1.4954 ~ 1.4961 in.)	37.97 mm (1.495 in.)
Marking:		
None	37.984 ~ 37.992 mm (1.4954 ~ 1.4958 in.)	– – –
○	37.993 ~ 38.000 mm (1.4958 ~ 1.4961 in.)	– – –
Connecting Rod Big End Inside Diameter:	41.000 ~ 41.016 mm (1.6142 ~ 1.6148 in.)	41.04 mm (1.616 in.)
Marking:		
None	41.000 ~ 41.008 mm (1.6142 ~ 1.6145 in.)	– – –
○	41.009 ~ 41.016 mm (1.6145 ~ 1.6148 in.)	– – –
Connecting Rod Big End Bearing Insert Thickness:		
Brown	1.475 ~ 1.480 mm (0.05807 ~ 0.05827 in.)	– – –
Black	1.480 ~ 1.485 mm (0.05827 ~ 0.05846 in.)	– – –
Blue	1.485 ~ 1.490 mm (0.05846 ~ 0.05866 in.)	– – –
Connecting Rod Bolt Stretch:	(Usable Range)	– – –
New Connecting Rod	0.25 ~ 0.34 mm (0.0098 ~ 0.0134 in.)	– – –
Used Connecting Rod	0.25 ~ 0.34 mm (0.0098 ~ 0.0134 in.)	– – –
Crankshaft Side Clearance	0.05 ~ 0.25 mm (0.0020 ~ 0.0098 in.)	0.45 mm (0.018 in.)
Crankshaft Runout	TIR 0.03 mm (0.001 in.) or less	TIR 0.08 mm (0.003 in.)
Crankshaft Main Bearing Insert/Journal Clearance	0.031 ~ 0.063 mm (0.0012 ~ 0.0025 in.)	0.09 mm (0.0035 in.)
Crankshaft Main Journal Diameter:	37.984 ~ 38.000 mm (1.4954 ~ 1.4961 in.)	37.96 mm (1.495 in.)
Marking:		
None	37.984 ~ 37.992 mm (1.4954 ~ 1.4957 in.)	– – –
1	37.993 ~ 38.000 mm (1.4958 ~ 1.4961 in.)	– – –

Specifications

Item	Standard	Service Limit
Crankcase Main Bearing Inside Diameter:	41.000 ~ 41.016 mm (1.6142 ~ 1.6148 in.)	– – –
Marking:		
○	41.000 ~ 41.008 mm (1.6142 ~ 1.6145 in.)	– – –
None	41.009 ~ 41.016 mm (1.6145 ~ 1.6148 in.)	– – –
Crankshaft Main Bearing Insert Thickness:		
Brown	1.490 ~ 1.494 mm (0.05866 ~ 0.05882 in.)	– – –
Black	1.494 ~ 1.498 mm (0.05882 ~ 0.05898 in.)	– – –
Blue	1.498 ~ 1.502 mm (0.05898 ~ 0.05913 in.)	– – –
Pistons		
Cylinder (Upper Crankcase) Inside Diameter	83.994 ~ 84.006 mm (3.3068 ~ 3.3073 in.)	84.09 mm (3.311 in.)
Piston Diameter	83.969 ~ 83.984 mm (3.3059 ~ 3.3065 in.)	83.82 mm (3.300 in.)
Piston/Cylinder Clearance	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in.)	– – –
Piston Ring/Groove Clearance:		
Top	0.030 ~ 0.070 mm (0.00118 ~ 0.00276 in.)	0.17 mm (0.0067 in.)
Second	0.020 ~ 0.060 mm (0.00079 ~ 0.00236 in.)	0.16 mm (0.0063 in.)
Piston Ring Groove Width:		
Top	0.92 ~ 0.94 mm (0.036 ~ 0.037 in.)	1.02 mm (0.040 in.)
Second	1.01 ~ 1.03 mm (0.040 ~ 0.041 in.)	1.11 mm (0.044 in.)
Piston Ring Thickness:		
Top	0.870 ~ 0.890 mm (0.0343 ~ 0.0350 in.)	0.80 mm (0.031 in.)
Second	0.970 ~ 0.990 mm (0.0382 ~ 0.0390 in.)	0.90 mm (0.035 in.)
Piston Ring End Gap:		
Top	0.20 ~ 0.30 mm (0.0079 ~ 0.0118 in.)	0.6 mm (0.02 in.)
Second	0.40 ~ 0.55 mm (0.0158 ~ 0.0217 in.)	0.9 mm (0.04 in.)
Transmission		
Shift Fork Ear Thickness	5.7 ~ 6.0 mm (0.22 ~ 0.24 in.)	5.6 mm (0.22 in.)
Shifter Groove Width	6.05 ~ 6.15 mm (0.238 ~ 0.242 in.)	6.3 mm (0.25 in.)
Shift Fork Guide Pin Diameter	6.9 ~ 7.0 mm (0.27 ~ 0.28 in.)	6.8 mm (0.27 in.)
Shift Drum Groove Width	7.05 ~ 7.20 mm (0.278 ~ 0.283 in.)	7.3 mm (0.29 in.)

Specifications

Connecting Rod Big End Bearing Insert Selection

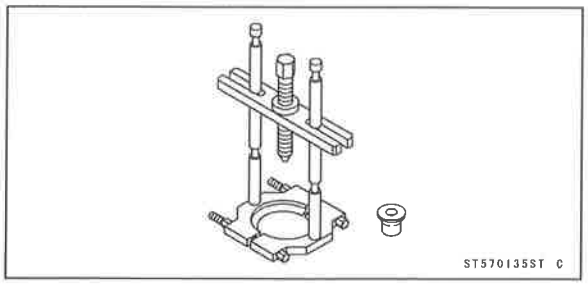
Con-rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0131
None	None	Black	92139-0130
○	○		
○	None	Blue	92139-0129

Crankshaft Main Bearing Insert Selection

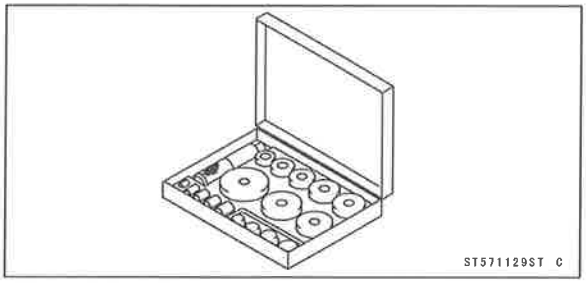
Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92139-0134	1, 3, 5
			92139-0137	2, 4
None	1	Black	92139-0133	1, 3, 5
○	None		92139-0136	2, 4
None	None	Blue	92139-0132	1, 3, 5
			92139-0135	2, 4

Special Tools and Sealant

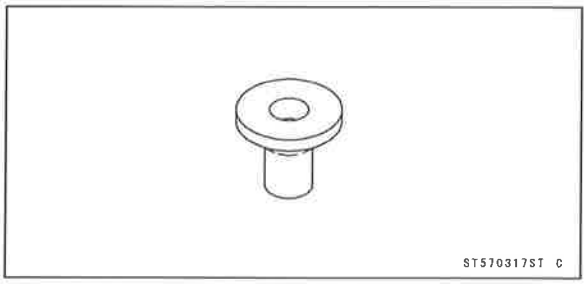
Bearing Puller:
57001-135



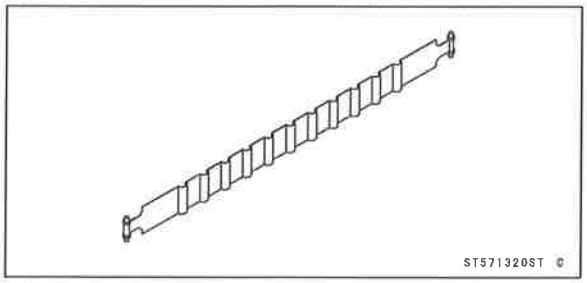
Bearing Driver Set:
57001-1129



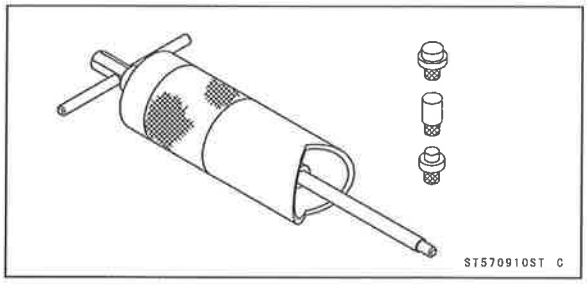
Bearing Puller Adapter:
57001-317



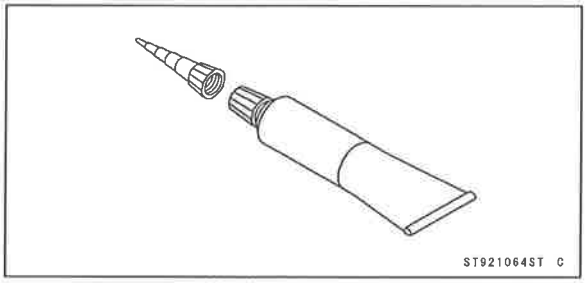
Piston Ring Compressor Belt, ϕ80 ~ ϕ91:
57001-1320



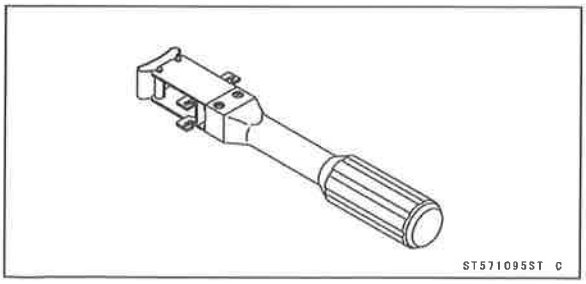
Piston Pin Puller Assembly:
57001-910



Liquid Gasket, TB1216B:
92104-1064



Piston Ring Compressor Grip:
57001-1095



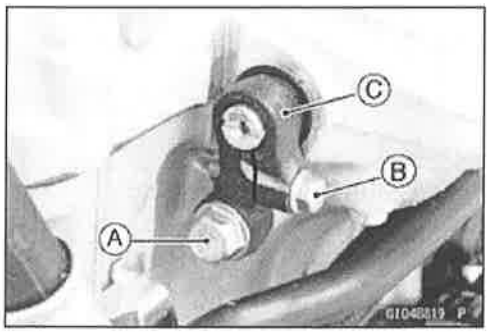
Crankcase Splitting

Crankcase Splitting

- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:

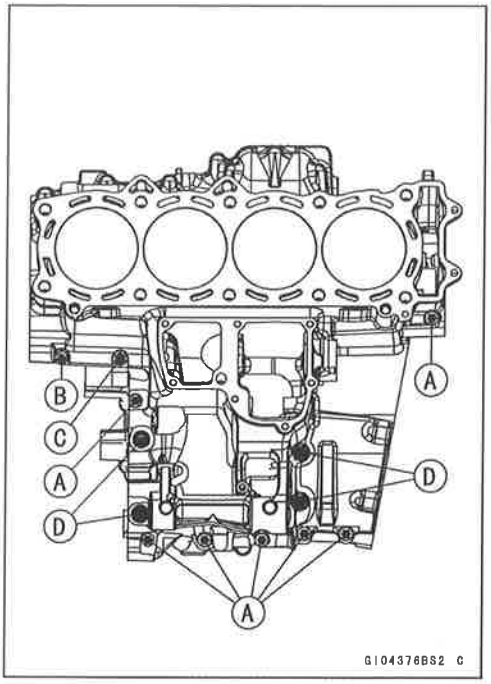
  Clutch (see Clutch Removal in the Clutch chapter)
  Starter Clutch (see Starter Clutch Removal)
  Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)
  Water Pump (see Water Pump Removal in the Cooling System chapter)
  Front Gear Case (see Front Gear Case Removal in the Final Drive chapter)
  Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
  Cylinder Head (see Cylinder Head Removal in the Engine Top End chapter)
  Starter Motor (see Starter Motor Removal in the Electrical System chapter)
  Oil Cooler (see Oil Cooler Removal in the Engine Lubrication System chapter)
  Oil Pan (see Oil Pan Removal in the Engine Lubrication System chapter)
  External Shift Mechanism (see External Shift Mechanism Removal)

- Remove the front balancer shaft clamp lever bolt [A].
- Loosen the front balancer shaft clamp bolt [B] and remove the front balancer shaft clamp lever [C].

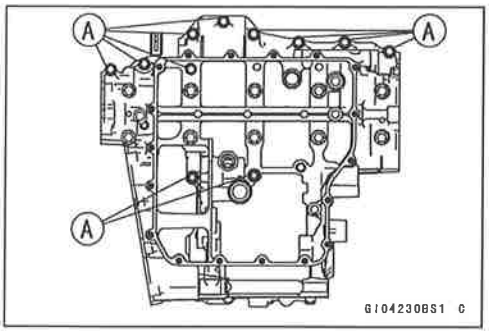


Crankcase Splitting

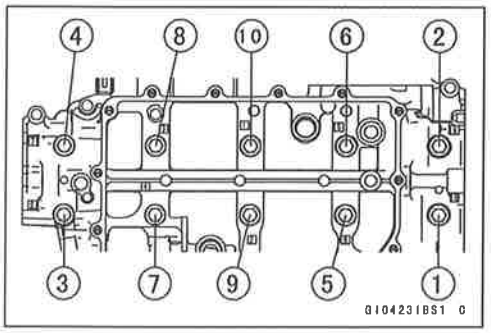
● Remove the upper crankcase bolts.
○First loosen the M6 bolts.
M6 Bolts [A]
M7 Bolt [B]
M7 Bolt with Clamp [C]
M8 Bolts with Washers [D]



● Remove the lower crankcase bolts.
○First loosen the M7 bolts [A].



○Next, loosen the M10 Bolts [1 ~10] (sequence numbers).
● Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase.
○Take care not to damage the crankcase.



Crankcase Splitting

Crankcase Assembly

NOTICE

The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

- With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.

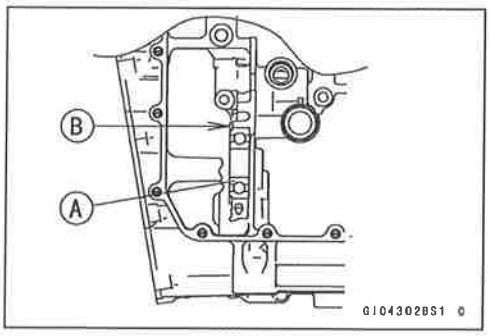
⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the crankcase in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the crankcase.

- Using compressed air, blow out the oil passages in the crankcase halves.

- Press the new drive shaft bearing [A] so that its stepped side [B] faces as shown.

Special Tool - Bearing Driver Set: 57001-1129

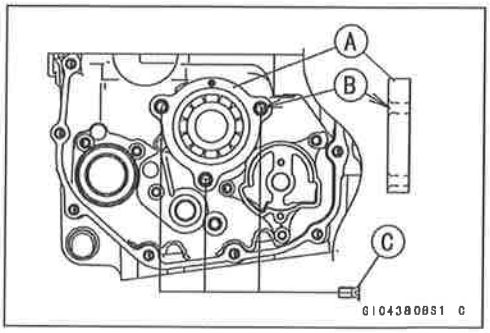


- Install the bearing position plate [A].

○Install the plate so that the stepped hole side [B] faces outside.

- Apply a non-permanent locking agent to the bearing position plate bolts [C].
- Tighten:

Torque - Bearing Position Plate Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)



- Press the new needle bearing [A] for the shift shaft so that its marked side [B] faces as shown.

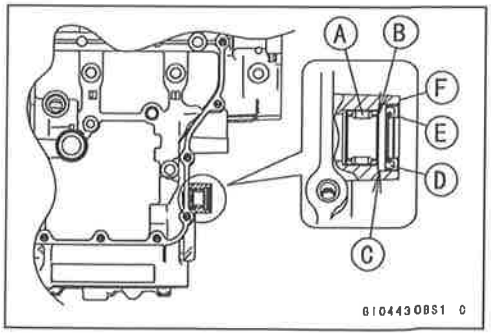
○Press the new needle bearing so that its surface is flush with the end of hole [C].

Special Tool - Bearing Driver Set: 57001-1129

- Press the new oil seal [D] so that the oil seal lip [E] faces to the outside, and the oil seal surface is flush with the surface [F] of the crankcase.

Special Tool - Bearing Driver Set: 57001-1129

- Apply grease to the oil seal lips.



Crankcase Splitting

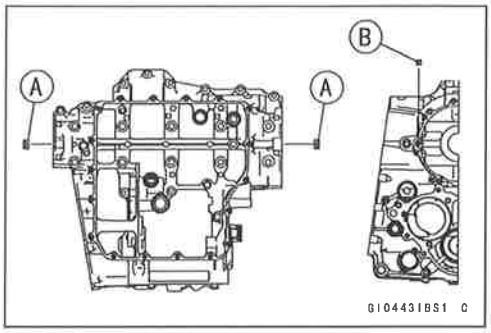
- When installing the oil passage plugs [A], note the following.
- Apply a non-permanent locking agent to the oil passage plugs.

○Tighten:

Torque - Oil Passage Plugs: 20 N·m (2.0 kgf·m, 15 ft·lb)

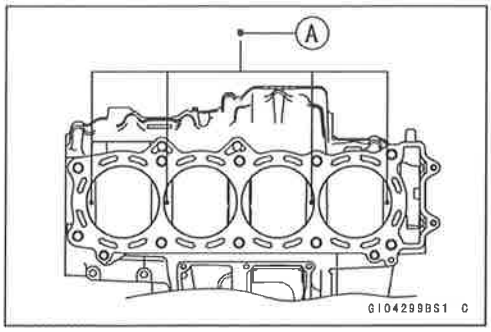
- When installing the plug [B], note the following.

○Replace the plug with a new one.
○Install the plug so that the chamfered side faces inside.

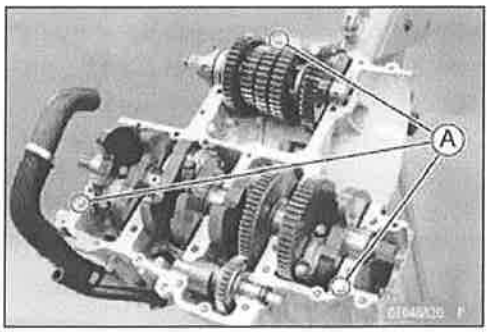


- Install the piston oil jets [A] to the upper crankcase.

Torque - Piston Oil Jets: 2.9 N·m (0.30 kgf·m, 26 in·lb)

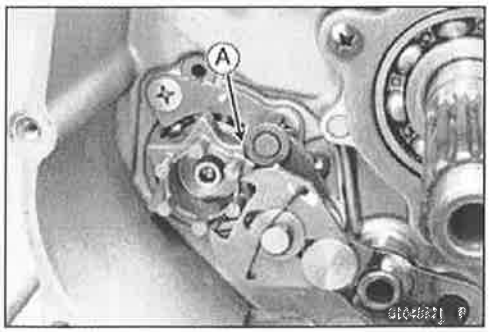


- Install:
  Pistons (see Piston Installation)
  Connecting Rods (see Connecting Rod Installation)
  Crankshaft (see Crankshaft Installation)
  Shift Drum and Shift Fork (see Shift Drum and Fork Installation)
  Transmission Shaft (see Transmission Shaft Installation)
  Front Balancer (see Front Blancer Installation)
  Dowel Pins [A]



- Before fitting the lower case on the upper case, check the following.

○Check to see that the shift drum and transmission gears are in the neutral position [A].



Crankcase Splitting

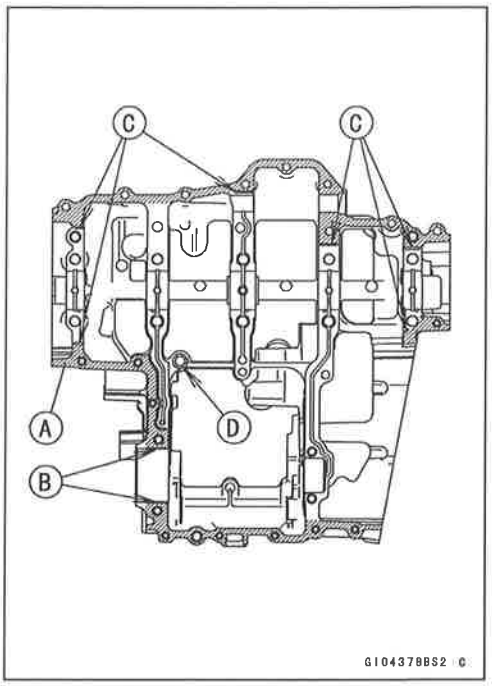
- Apply liquid gasket [A] to the mating surface of the lower crankcase half as shown.

Sealant - Liquid Gasket, TB1216B: 92104-1064

NOTE

○Aster tightening the crankcase bolts, wipe up the liquid gasket seeping out the output shaft bearing hole [B].

○Make the application finish within 20 minutes when the liquid gasket to the mating surface of the lower crankcase half is applied.



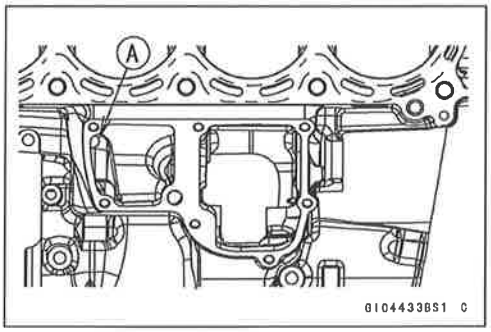
NOTICE

Do not apply liquid gasket to the grooves [C] inside from the crankshaft main bearing inserts and balancer bearing.

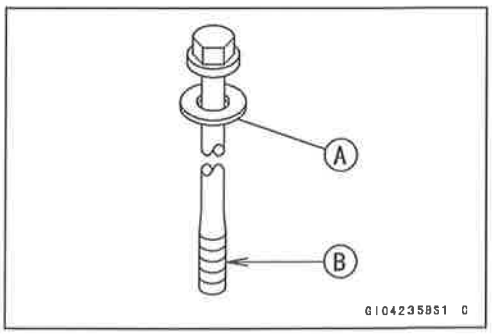
NOTICE

Do not plug the inside of breather hole [D] with liquid gasket.

- Fit the lower crankcase half to the upper crankcase half.
- Be sure that the breather hole [A] on the upper crankcase is not plugged with liquid gasket.



- The M10 bolts have washers (flat), replace them with new ones. (Engine No. ~ ZXT40AE08970)
- The M10 bolts have washers (wave), replace them with new ones. (Engine No. ZXT40AE08971 ~)
- Apply molybdenum disulfide oil solution to the seating surfaces [A] of the washers and the threads [B] of the M10 bolts.



- Tighten the lower crankcase bolts by the following steps.

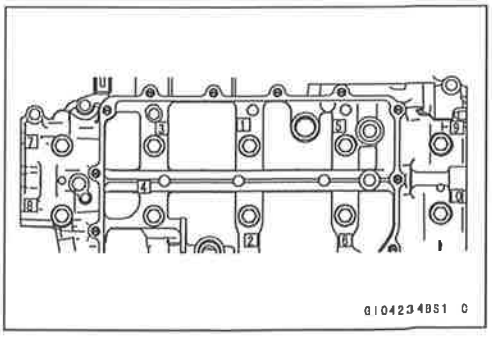
○Following the sequence numbers on the lower crankcase half, tighten the M10 bolts [1 ~ 10] with washers.

Torque - Crankcase Bolts (M10):

Engine No.:

~ ZXT40AE08970 47 N·m (4.8 kgf·m, 35 ft·lb)

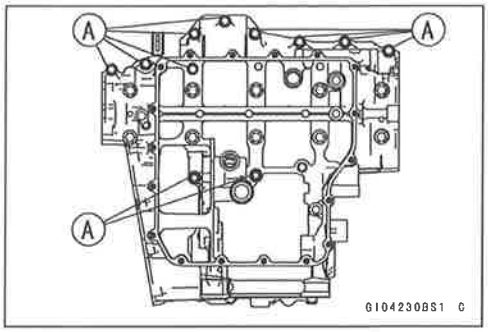
ZXT40AE08971 ~ 49 N·m (5.0 kgf·m, 36 ft·lb)



Crankcase Splitting

OTighten the M7 bolts [A].

Torque - Crankcase Bolts (M7): 20 N·m (2.0 kgf·m, 15 ft·lb)



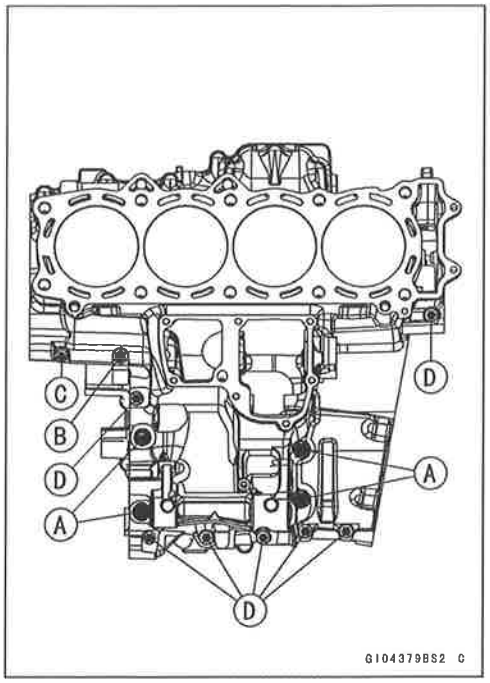
● Tighten the upper crankcase bolts in the order listed.

OThe M8 bolts have washers, replace them with new ones.

OTighten:

M8 Bolts with Washers [A]
M7 Bolt with Clamp [B]
M7 Bolt [C]
M6 Bolts [D]

Torque - Crankcase Bolts (M8): 27 N·m (2.8 kgf·m, 20 ft·lb)
Crankcase Bolts (M7): 20 N·m (2.0 kgf·m, 15 ft·lb)
Crankcase Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)



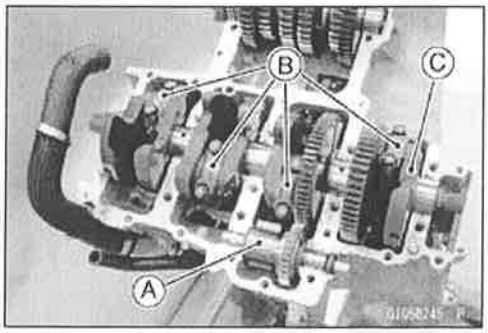
● After tightening all crankcase bolts, check the following items.

OCrankshaft and transmission shafts turn freely.

OWhile spinning the output shaft, gears shift smoothly from the 1st to neutral, and neutral to 1st.

Crankshaft and Connecting Rods

Crankshaft Removal



- Split the crankcase (see Crankcase Splitting).
- Remove:
  Front Balancer [A] (see Front Balancer Removal)
  Connecting Rod Big End Caps [B] (see Piston Removal)
  Crankshaft [C]

Crankshaft Installation

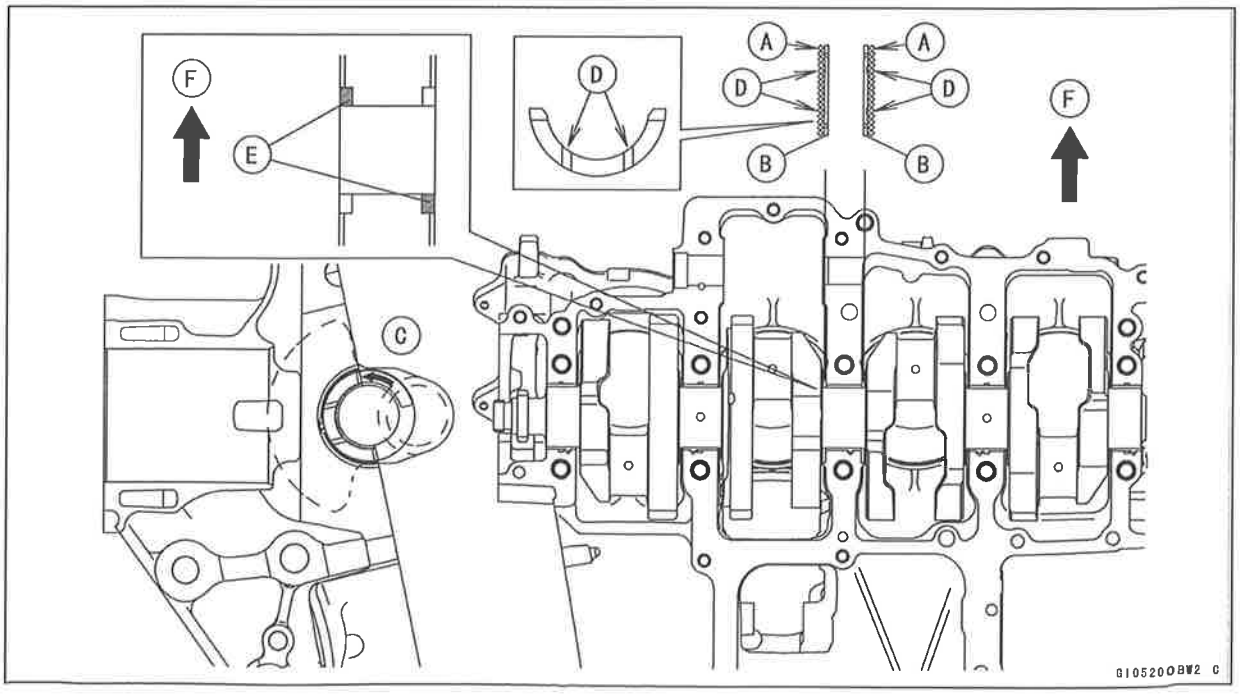
NOTICE

If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

- Apply molybdenum disulfide oil solution to the crankshaft main bearing inserts.
- Follow the next procedure to insert the thrust washers on the upper crankcase half, after installing connecting rod on the crankshaft (see Connecting Rod Installation).
- Apply molybdenum disulfide grease to the outside surfaces [A] of both thrust washers [B].
- Slide [C] one thrust washer into the upper crankcase half.
- Move the crankshaft to the left or right and then slide the other washer into the upper crankcase half.

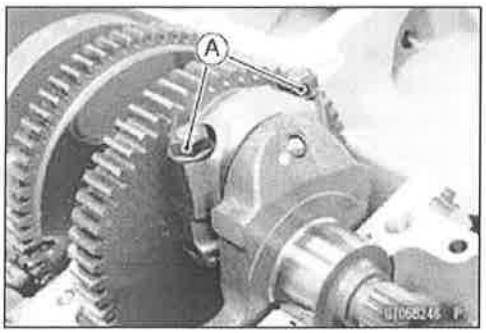
NOTE

○*Slide the thrust washers so that the oil grooves [D] face outward. Make sure that the blue-painted edges [E] are positioned as shown.*
Front [F]



Crankshaft and Connecting Rods

Connecting Rod Removal



- Split the crankcase (see Crankcase Splitting).
- Remove the connecting rod nuts [A].

NOTE

○Mark and record the locations of the connecting rods and their big end caps so that they can be reassembled in their original positions.

- Remove the piston (see Piston Removal).

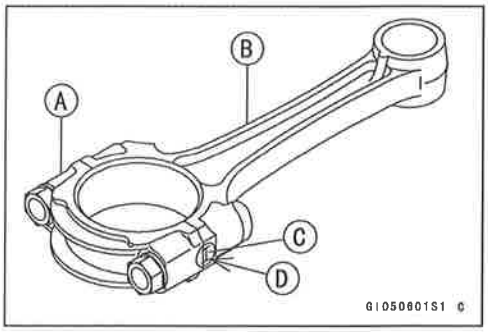
NOTICE

Discard the connecting rod bolts. To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.

Connecting Rod Installation

NOTICE

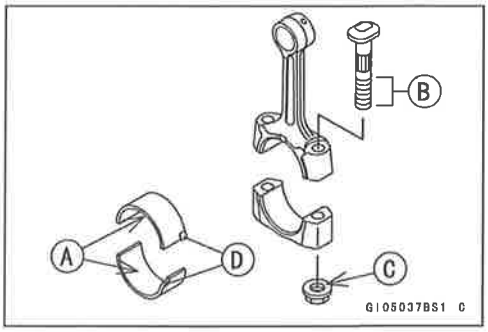
To minimize vibration, the connecting rods should have the same weight mark.



Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark [D]: "○" or no mark

NOTICE

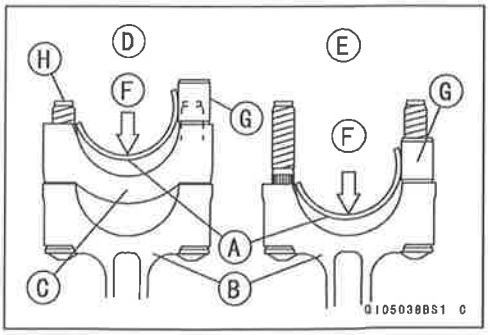
If the connecting rods, big end bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.



- Apply molybdenum disulfide oil to the inner surface of the upper and lower bearing inserts [A].
- Apply molybdenum disulfide oil solution to the threads [B] and seating surface [C] of the connecting rod nuts.
- Install the inserts so that their nails [D] are on the same side and fit them into the recess of the connecting rod and cap.

NOTICE

Wrong application of oil and grease could cause bearing damage.



○When installing the inserts [A], be careful not to damage the insert surface with the edge of the connecting rod [B] or the cap [C]. One way to install inserts is as follows.
Installation [D] to Cap
Installation [E] to Connecting Rod
Push [F]
Spare Dowel Pin [G]
Connecting Rod Bolts [H]

- Remove debris and clean the surface of inserts.
- Install the cap on the connecting rod aligning the weight and diameter marks.

Crankshaft and Connecting Rods

- Install each connecting rod on its original crankpin.

○The connecting rod big end is bolted using the "plastic region fastening method".

○This method precisely achieves the needed clamping force without exceeding it unnecessarily, allowing the use of thinner, lighter bolts further decreasing connecting rod weight.

○There are two types of the plastic region fastening. One is a bolt length measurement method and other is a rotation angle method. Observe one of the following two, but the bolt length measurement method is preferable because this is a more reliable way to tighten the big end nuts.

NOTICE

The connecting rod bolts are designed to stretch when tightened. Never reuse the connecting rod bolts. See the table below for correct bolt and nut usage.

NOTICE

Be careful not to overtighten the nuts.
The bolts must be positioned on the seating surface correctly to prevent the bolt heads from hitting the crankcase.

(1) Bolt Length Measurement Method

- Be sure to clean the bolts, nuts, and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts, and nuts are treated with an anti-rust solution.

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean them.

NOTICE

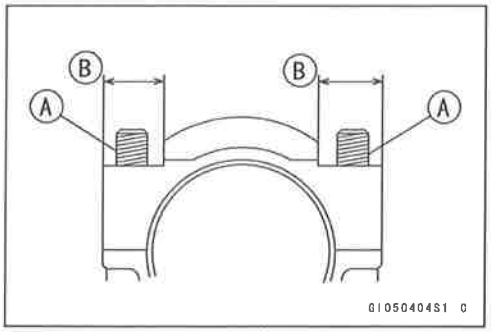
Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.

Crankshaft and Connecting Rods

- Install new bolts in reused connecting rod.

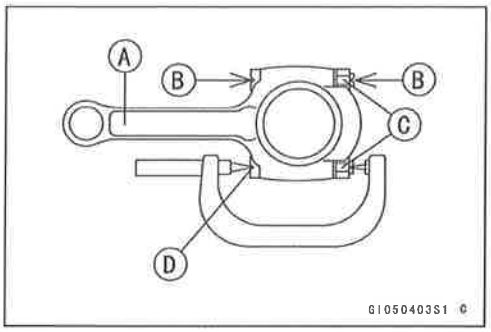
★If the connecting rod assembly was replaced, use the bolts and nuts attached to the new connecting rod assembly.

- Apply a small amount of molybdenum disulfide oil solution to the following portions.
  Threads [A] of Nuts and Bolts
  Seating Surfaces [B] of Nuts and Connecting Rods



- Dent both bolt head and bolt tip with a punch as shown.
- Before tightening, use a point micrometer to measure the length of new connecting rod bolts and record the values to find the bolt stretch.
  Connecting Rod [A]
  Dent here with a punch [B].
  Nuts [C]
  Fit micrometer pins into dents [D].
- Apply a small amount of molybdenum disulfide oil to the following.
  Threads of Nuts and Bolts
  Seating Surfaces of Nuts and Connecting rods
- Tighten the big end nuts until the bolt elongation reaches the length specified in the table.
- Check the length of the connecting rod bolts.

★If the stretch is more than the usable range, the bolt has stretched too much. An overelongated bolt may break in use.



Bolt Length after tightening − Bolt Length before tightening = Bolt Stretch

Connecting Rod Assy	Bolt	Nut	Usable Range of Connecting Rod Bolt Stretch
New	Use the bolts attached to new con-rod.	Attached to new con-rod	0.25 ~ 0.34 mm (0.0098 ~ 0.0134 in.)
	New	New	
Used	Replace the bolts with new ones.	Replace the nuts with new ones.	0.25 ~ 0.34 mm (0.0098 ~ 0.0134 in.)

Crankshaft and Connecting Rods

(2) Rotation Angle Method

★ If you don't have a point micrometer, you may tighten the nuts using the "Rotation Angle Method".

- Be sure to clean the bolts, nuts and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts and nuts are treated with an anti-rust solution.

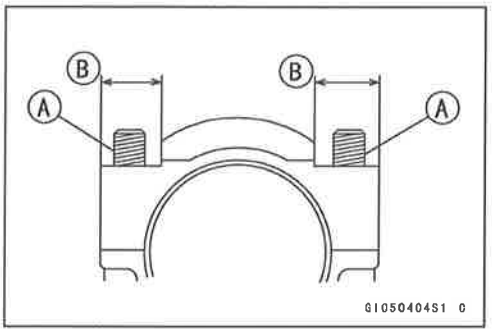
⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean them.

NOTICE

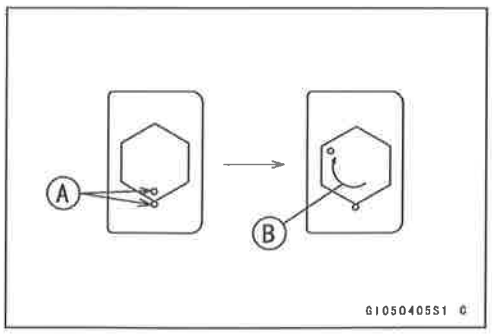
Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.

- Install new bolts in reused connecting rods.
- Apply a small amount of molybdenum disulfide oil to the following.
  Threads [A] of Bolts
  Seating Surfaces [B] of Nuts on the Connecting Rods



- First, tighten the nuts to the specified torque. See the table below.
- Next, tighten the nuts **120° ±5°**.

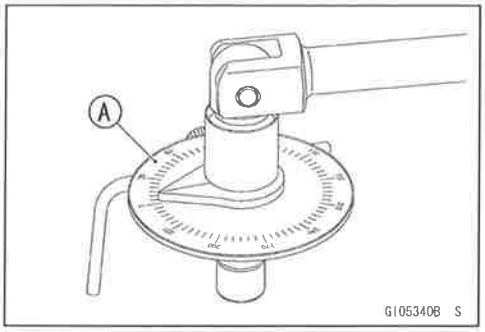
○Mark [A] the connecting rod big end caps and nuts so that nuts can be turned 120° [B] properly.



Connecting Rod Assy	Bolt	Nut	Torque + Angle N·m (kgf·m, ft·lb)
New	Use the bolts attached to new con-rod.	Attached to new con-rod	21.6 (2.2, 16) + 120°
	New	New	21.6 (2.2, 16) + 120°
Used	Replace the bolts with new ones	Replace the nuts with new ones	21.6 (2.2, 16) + 120°

Crankshaft and Connecting Rods

- The nuts can be tightened by using a torque angle gauge [A].



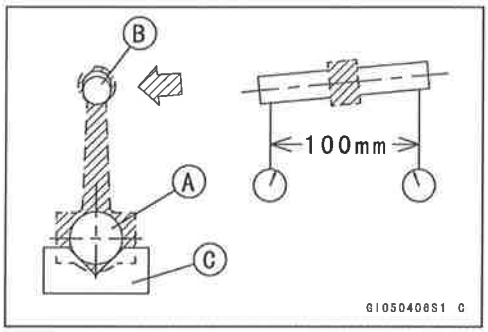
Crankshaft/Connecting Rod Cleaning

- After removing the connecting rods from the crankshaft, clean them with a high flash-point solvent.
- Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

Connecting Rod Bend Inspection

- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.

★If connecting rod bend exceeds the service limit, the connecting rod must be replaced.

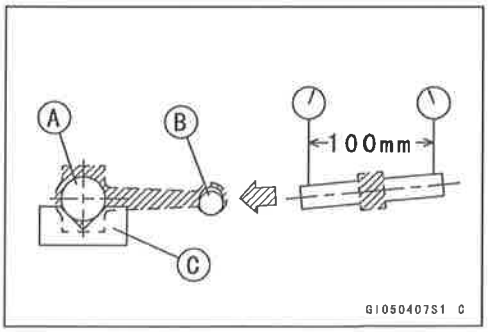


Connecting Rod Bend
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Connecting Rod Twist Inspection

- With the big-end arbor [A] still on V block [C], hold the connecting rod horizontally and measure the amount that the arbor [B] varies from being paralleled with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.

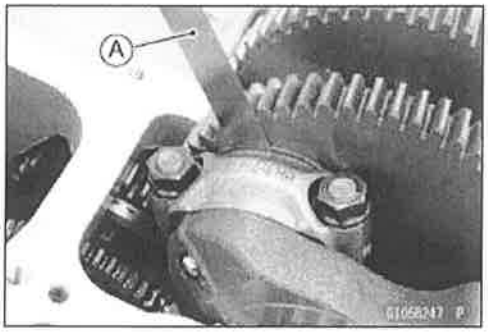
★If connecting rod twist exceeds the service limit, the connecting rod must be replaced.



Connecting Rod Twist
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Crankshaft and Connecting Rods

Connecting Rod Big End Side Clearance Inspection



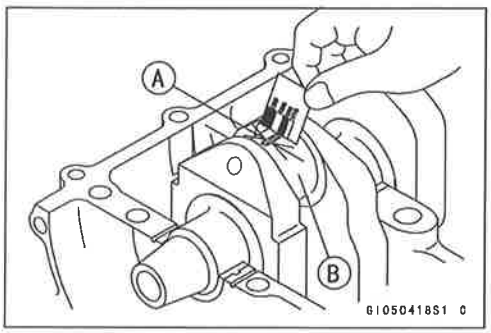
- Measure connecting rod big end side clearance.

○Insert a thickness gauge [A] between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance
Standard: 0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)
Service Limit: 0.6 mm (0.02 in.)

★If the clearance exceeds the service limit, replace the connecting rod with new one and then check clearance again. If clearance is too large after connecting rod replacement, the crankshaft also must be replaced.

Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection



- Using a plastigage [A], measure the bearing insert/crankpin [B] clearance.
- Tighten the big end nuts to the specified torque (see Connecting Rod Installation).

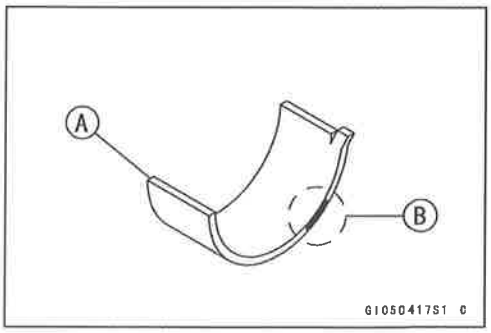
NOTE

○*Do not move the connecting rod and crankshaft during clearance measurement.*

NOTICE

After measurement, replace the connecting rod bolts.

Connecting Rod Big End Bearing Insert/Crankpin Clearance
Standard: 0.048 ~ 0.086 mm (0.0019 ~ 0.0034 in.)
Service Limit: 0.12 mm (0.0047 in.)



★If the clearance is within the standard, no bearing replacement is required.

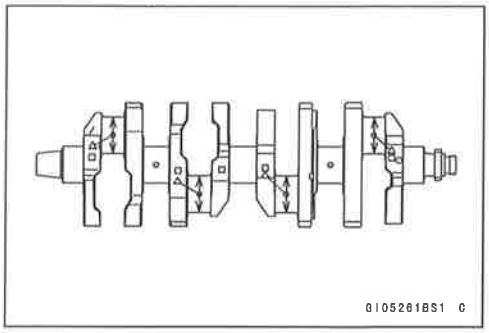
★If the clearance is between 0.087 mm (0.0034 in.) and the service limit (0.12 mm, 0.0047 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If the clearance exceeds the service limit, measure the diameter of the crankpins.

Crankpin Diameter
Standard: 37.984 ~ 38.000 mm (1.4954 ~ 1.4961 in.)
Service Limit: 37.97 mm (1.495 in.)

Crankshaft and Connecting Rods

★If any crankpin has worn past the service limit, replace the crankshaft with a new one.
★If the measured crankpin diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.



Crankpin Diameter Marks

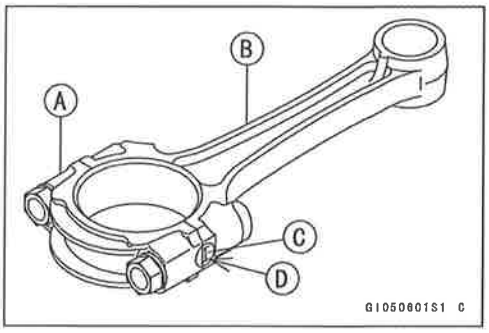
None	**37.984 ~ 37.992 mm (1.4954 ~ 1.4958 in.)**
○	**37.993 ~ 38.000 mm (1.4958 ~ 1.4961 in.)**

△: Crankpin Diameter Marks, "○" or no mark.

- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

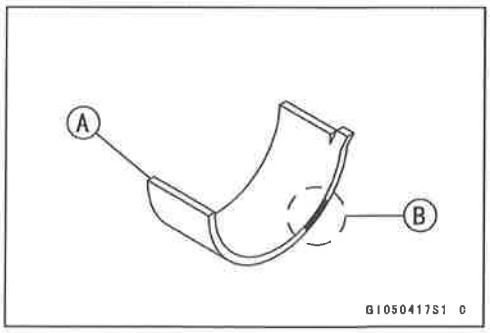
○*The mark already on the big end should almost coincide with the measurement.*



Connecting Rod Big End Inside Diameter Marks

None	**41.000 ~ 41.008 mm (1.6142 ~ 1.6145 in.)**
○	**41.009 ~ 41.016 mm (1.6145 ~ 1.6148 in.)**

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark (Around Weight Mark) [D]: "○" or no mark



- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding.
  Size Color [B]

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0131
None	None	Black	92139-0130
○	○		
○	None	Blue	92139-0129

- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

Crankshaft and Connecting Rods

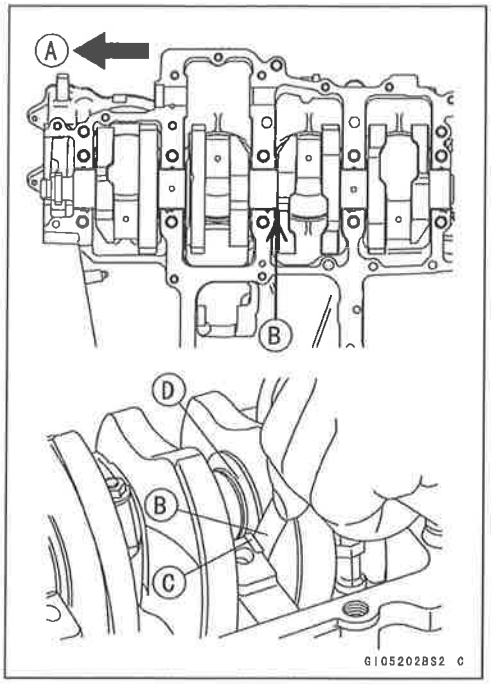
Crankshaft Side Clearance Inspection

- Move the crankshaft to the alternator side [A].
- Insert a thickness gauge [B] between the thrust washer [C] and the crank web [D] of the No. 3 main journal to determine clearance.

Crankshaft Side Clearance
Standard: 0.05 ~ 0.25 mm (0.0020 ~ 0.0098 in.)
Service Limit: 0.45 mm (0.018 in.)

★If the clearance exceeds the service limit, replace the thrust washers as a set.

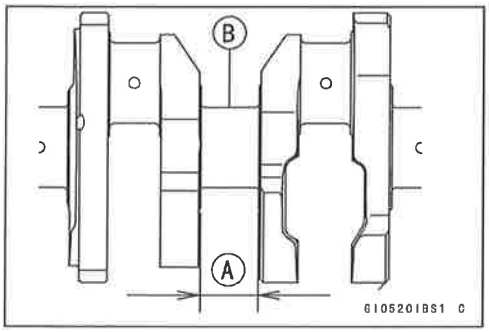
Thrust Washer P/No.	Thickness	Edge Colar
92200-0331	2.45 ~ 2.50 mm (0.0965 ~ 0.0984 in.)	Blue



- Measure the crankshaft #3 main journal width [A].

★If the measurement exceeds the standard, replace the crankshaft [B].

Crankshaft #3 Main Journal Width
Standard: 27.45 ~ 27.50 mm (1.0807 ~ 1.0827 in.)

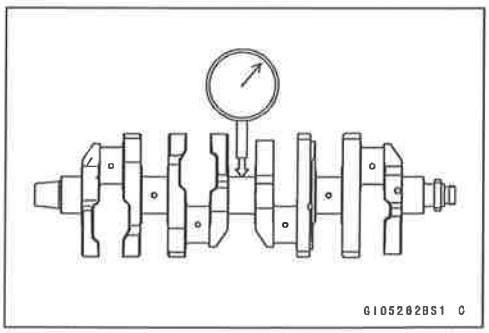


Crankshaft Runout Inspection

- Measure the crankshaft runout.

★If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout
Standard: TIR 0.03 mm (0.001 in.) or less
Service Limit: TIR 0.08 mm (0.003 in.)

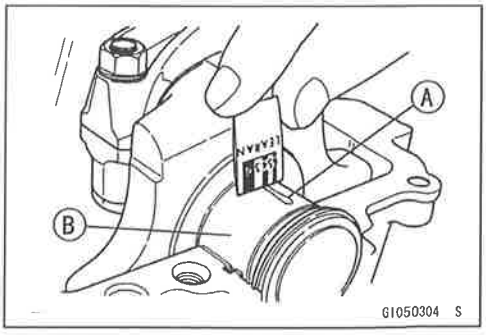


Crankshaft Main Bearing Insert/Journal Wear Inspection

- Using a plastigage (press gauge) [A], measure the bearing insert/journal [B] clearance.

NOTE

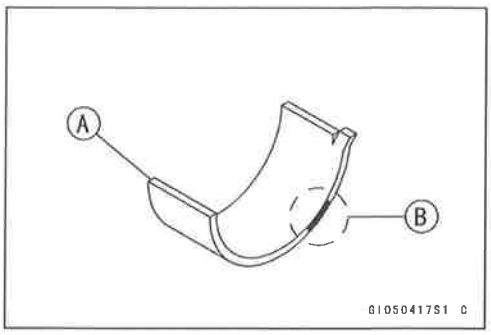
- *Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).*
- *Do not turn the crankshaft during clearance measurement.*
- *Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.*



Crankshaft and Connecting Rods

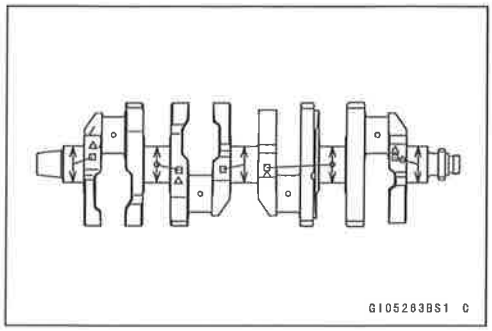
Crankshaft Main Bearing Insert/Journal Clearance
Standard: 0.031 ~ 0.063 mm (0.0012 ~ 0.0025 in.)
Service Limit: 0.09 mm (0.0035 in.)

★If the clearance is within the standard, no bearing replacement is required.
★If the clearance is between 0.064 mm (0.0025 in.) and the service limit (0.09 mm, 0.0035 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
★If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.



Crankshaft Main Journal Diameter
Standard: 37.984 ~ 38.000 mm (1.4954 ~ 1.4961 in.)
Service Limit: 37.96 mm (1.495 in.)

★If any journal has worn past the service limit, replace the crankshaft with a new one.
★If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.



Crankshaft Main Journal Diameter Marks
None 37.984 ~ 37.992 mm (1.4954 ~ 1.4957 in.)
1 37.993 ~ 38.000 mm (1.4958 ~ 1.4961 in.)

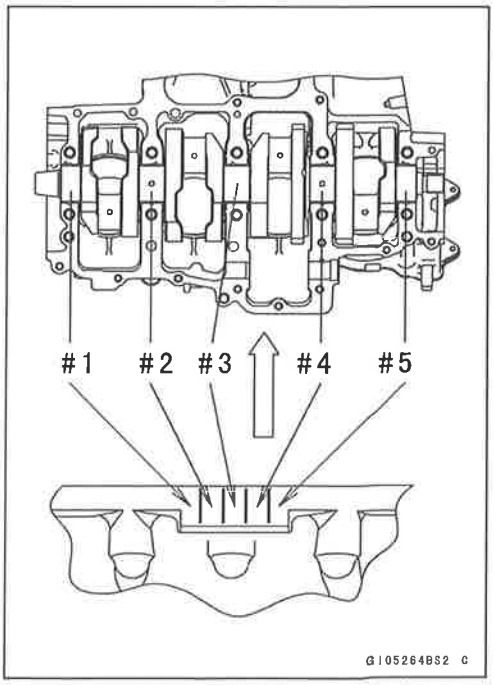
□: Crankshaft Main Journal Diameter Marks, "1" or no mark.

- Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.
  Crankcase Main Bearing Inside Diameter Marks: "○" mark or no mark.
- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).

NOTE

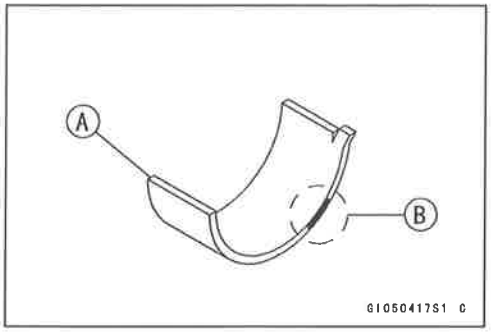
○*The mark already on the upper crankcase half should almost coincide with the measurement.*

Crankcase Main Bearing Inside Diameter Marks
○ 41.000 ~ 41.008 mm (1.6142 ~ 1.6145 in.)
None 41.009 ~ 41.016 mm (1.6145 ~ 1.6148 in.)



Crankshaft and Connecting Rods

- Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding.
  Size Color [B]



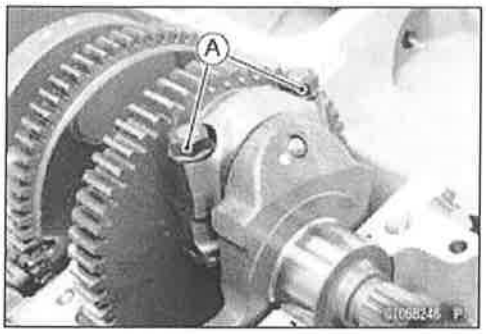
Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert		
		Size Color	Part Number	Journal Nos.
O	1	Brown	92139-0134	1, 3, 5
			92139-0137	2, 4
None	1	Black	92139-0133	1, 3, 5
O	None		92139-0136	2, 4
None	None	Blue	92139-0132	1, 3, 5
			92139-0135	2, 4

- Install the new inserts in the crankcase halves and check insert/journal clearance with the plastigage.

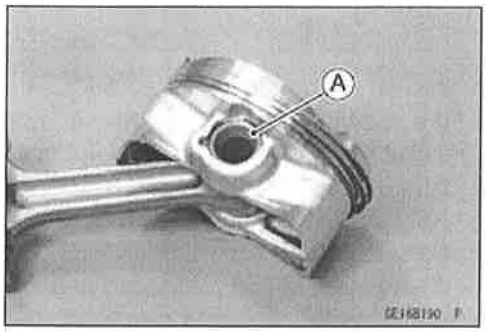
Pistons

Piston Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the connecting rod nuts [A].
- Remove the connecting rod big end caps.
- Remove the piston with connecting rod to the cylinder head side.



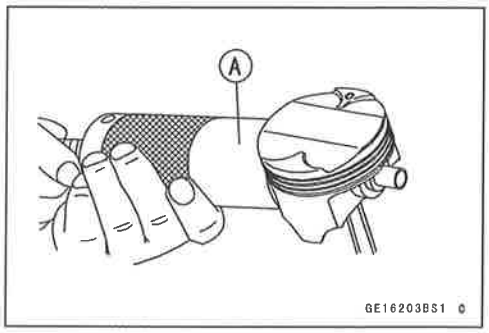
- Remove the piston pin snap ring [A].



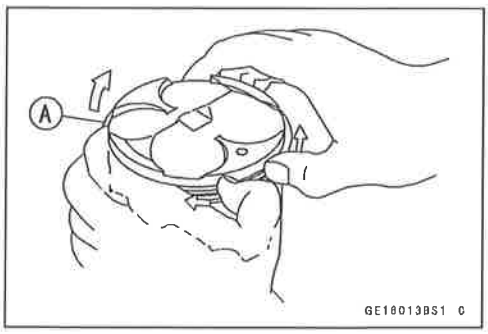
- Remove the piston pins.

Special Tool - Piston Pin Puller Assembly [A]: 57001-910

- Remove the pistons.



- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.

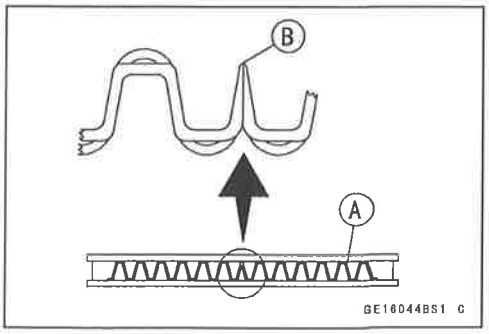


Piston Installation

- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander and one below it.

○Spread the rail with your thumbs, but only enough to fit the rail over the piston.

○Release the rail into the bottom piston ring groove.



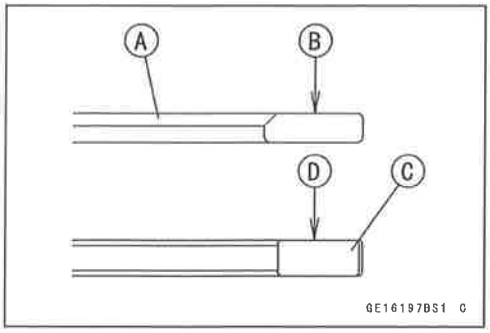
NOTE

○*The oil ring rails have no "top" or "bottom".*

Pistons

- Do not mix up the top and second ring.
- Install the top ring [A] so that the "R" mark [B] faces up.
- Install the second ring [C] so that the "RN" mark [D] faces up.

○Apply molybdenum disulfide oil solution to the piston rings.



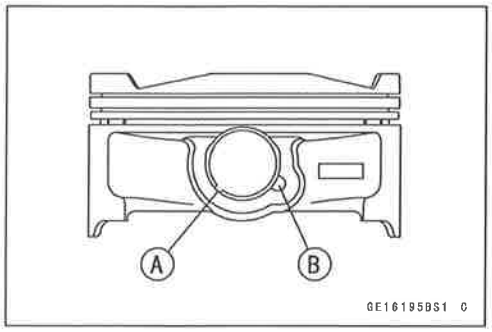
NOTE

○*If a new piston is used, use new piston ring.*

- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.

○Apply molybdenum disulfide oil solution to the piston pins and piston journals.

○When installing the piston pin snap ring, compress it only enough to install it and no more.

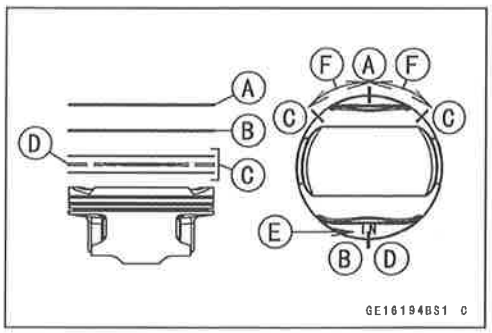


NOTICE

Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.

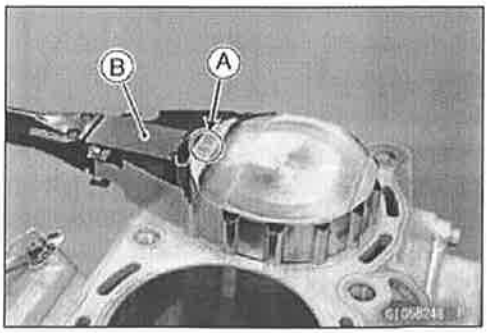
- Remove:
  Crankshaft (see Crankshaft Removal)
  Output Shaft (see Transmission Shaft Removal)

- The piston ring openings must be positioned as shown. The openings of the oil ring steel rails must be about 30 ~ 40° of angle from the opening of the top ring.
  Top Ring [A]
  Second Ring [B]
  Oil Ring Steel Rails [C]
  Oil Ring Expander [D]
  IN Mark [E]
  30 ~ 40° [F]



- Install the piston with its marking IN [A] facing intake side.
- Using the piston ring compressor assy [B] to install the piston from the cylinder head side.

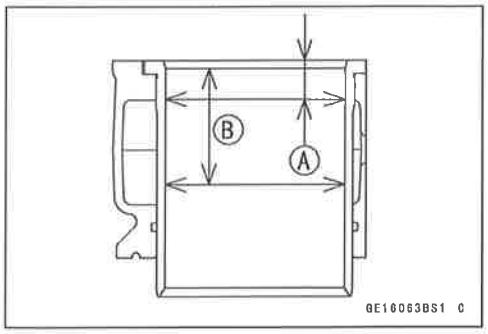
Special Tools - Piston Ring Compressor Grip: 57001-1095
Piston Ring Compressor Belt, ϕ80 ~ ϕ91: 57001-1320



- Install the crankshaft (see Crankshaft Installation).
- Install the connecting rod to the crankshaft (see Connecting Rod Installation).

Pistons

Cylinder Wear (Upper Crankcase) Inspection



- Since there is a difference in cylinder wear (upper crankcase) in different directions, take a side-to-side and a front-to-back measurement at each of the two locations (total of four measurements) shown.

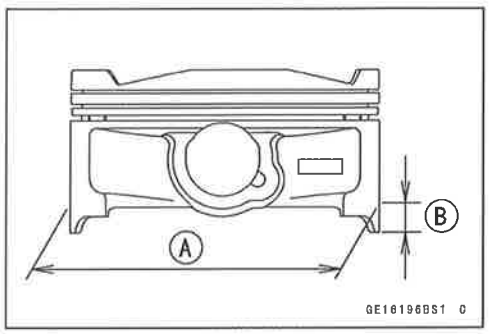
★If any of the cylinder inside diameter measurements exceeds the service limit, replace the crankcase.

10 mm (0.39 in.) [A]
60 mm (2.36 in.) [B]

Cylinder Inside Diameter

Standard:	**83.994 ~ 84.006 mm (3.3068 ~ 3.3073 in.)**
Service Limit:	**84.09 mm (3.311 in.)**

Piston Wear Inspection



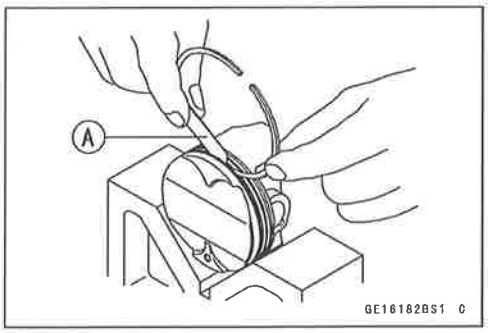
- Measure the outside diameter [A] of each piston 13 mm (0.39 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

★If the measurement is under service limit, replace the piston.

Piston Diameter

Standard:	**83.969 ~ 83.984 mm (3.3059 ~ 3.3065 in.)**
Service Limit:	**83.82 mm (3.300 in.)**

Piston Ring, Piston Ring Groove Wear Inspection



- Check for uneven groove wear by inspecting the ring seating.

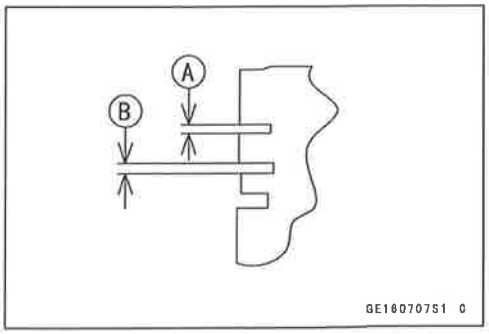
★The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.

- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.

Piston Ring/Groove Clearance

Standard:	
Top	**0.030 ~ 0.070 mm (0.00118 ~ 0.00276 in.)**
Second	**0.020 ~ 0.060 mm (0.00079 ~ 0.00236 in.)**
Service Limit:	
Top	**0.17 mm (0.0067 in.)**
Second	**0.16 mm (0.0063 in.)**

Piston Ring Groove Width Inspection



- Measure the piston ring groove width.

○Use a vernier caliper at several points around the piston.

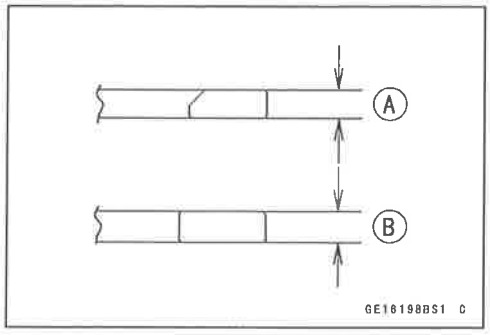
Piston Ring Groove Width

Standard:	
Top [A]	**0.92 ~ 0.94 mm (0.036 ~ 0.037 in.)**
Second [B]	**1.01 ~ 1.03 mm (0.040 ~ 0.041 in.)**
Service Limit:	
Top [A]	**1.02 mm (0.040 in.)**
Second [B]	**1.11 mm (0.044 in.)**

★If the width of any of the two grooves is wider than the service limit at any point, replace the piston.

Pistons

Piston Ring Thickness Inspection



- Measure the piston ring thickness.

○Use the micrometer to measure at several points around the ring.

Piston Ring Thickness

Standard:

Top [A]	**0.870 ~ 0.890 mm (0.0343 ~ 0.0350 in.)**
Second [B]	**0.970 ~ 0.990 mm (0.0382 ~ 0.0390 in.)**

Service Limit:

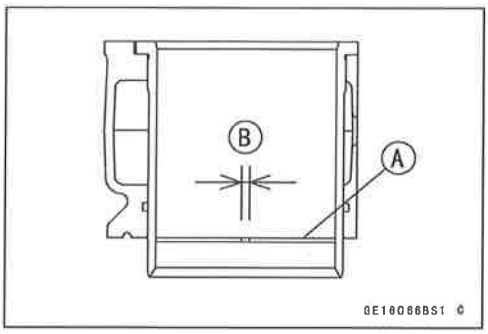
Top [A]	**0.80 mm (0.031 in.)**
Second [B]	**0.90 mm (0.035 in.)**

★If any of the measurements is less than the service limit on either of the rings, replace all the rings.

NOTE

○*When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.*

Piston Ring End Gap Inspection



- Place the piston ring [A] inside the cylinder (upper crankcase), using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
- Measure the gap [B] between the ends of the ring with a thickness gauge.

Piston Ring End Gap

Standard:

Top	**0.20 ~ 0.30 mm (0.0079 ~ 0.0118 in.)**
Second	**0.40 ~ 0.55 mm (0.0158 ~ 0.0217 in.)**

Service Limit:

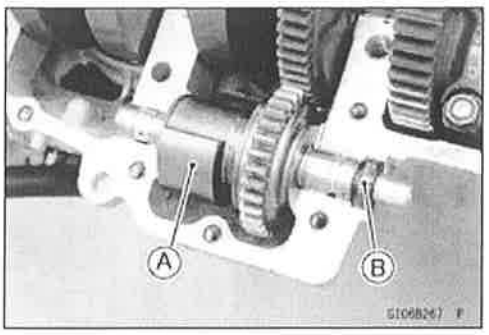
Top	**0.6 mm (0.02 in.)**
Second	**0.9 mm (0.04 in.)**

★If the end gap of either ring is greater than the service limit, replace all the rings.

Balancer

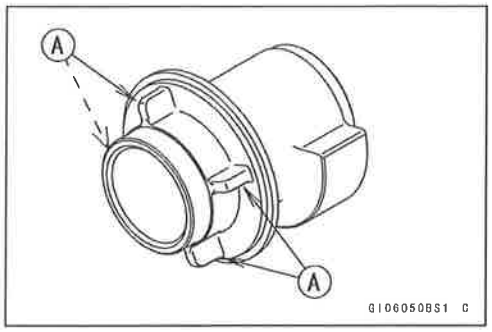
Front Balancer Removal

- Split the crankcase (see Crankcase Splitting).
- Remove:
  Front Balancer [A]
  Balancer Shaft Oil Seal [B]



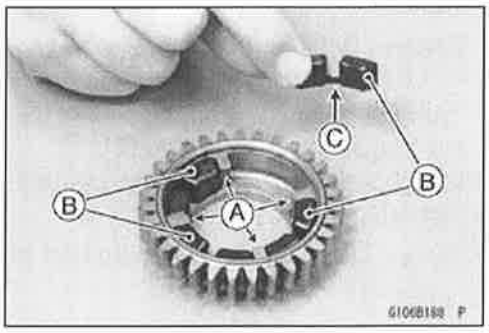
Front Balancer Installation

- Apply molybdenum disulfide oil solution to the ribs [A] of the balancer.



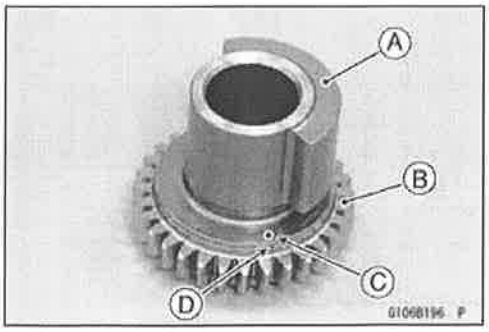
- Apply molybdenum disulfide oil solution to the ribs [A] of the balancer gear.
- Check that the rubber dampers [B] are in place.

○Face the linked portion [C] to the bottom.



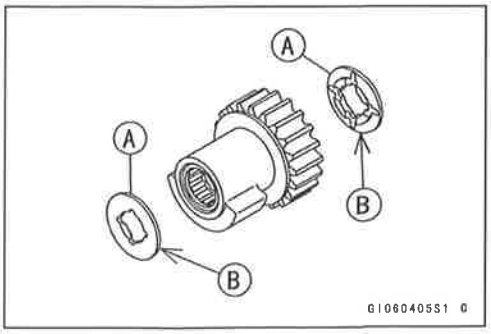
- Install the balancer weight [A] into the gear [B].

○Align the punch mark [C] of the balancer weight to the groove [D] of the gear.



- Apply molybdenum disulfide oil solution to the needle bearings. Insert the needle bearings.
- Fit the copper washers [A] on both ends of the weight and gear assembly.

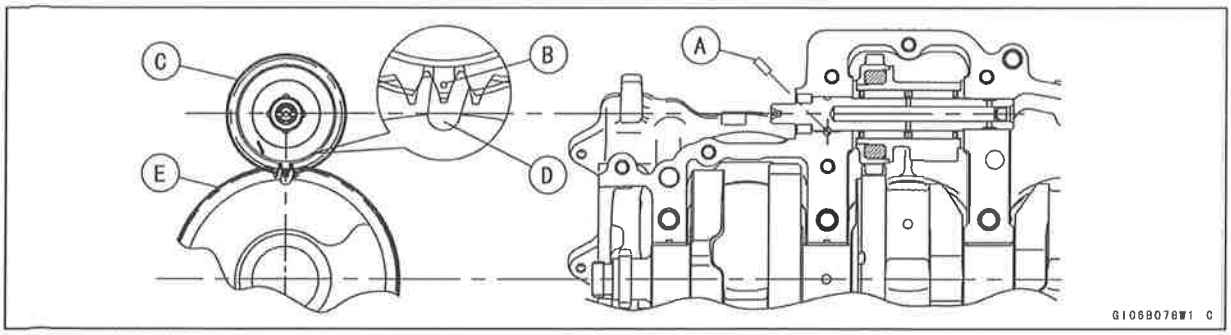
○The projected sides [B] face inward.



Balancer

- Position the crankshaft at #2, 3 position TDC.
- Insert the pin [A].
- Set the front balancer on the upper crankcase half.

○Align the punch mark [B] on the balancer gear [C] with the mark [D] on the balancer drive gear [E] of crankshaft.



- Assemble the crankcase (see Crankcase Assembly).
- Install the new oil seal [A] so that its surface [B] is flush with the surface of the crankcase [C].

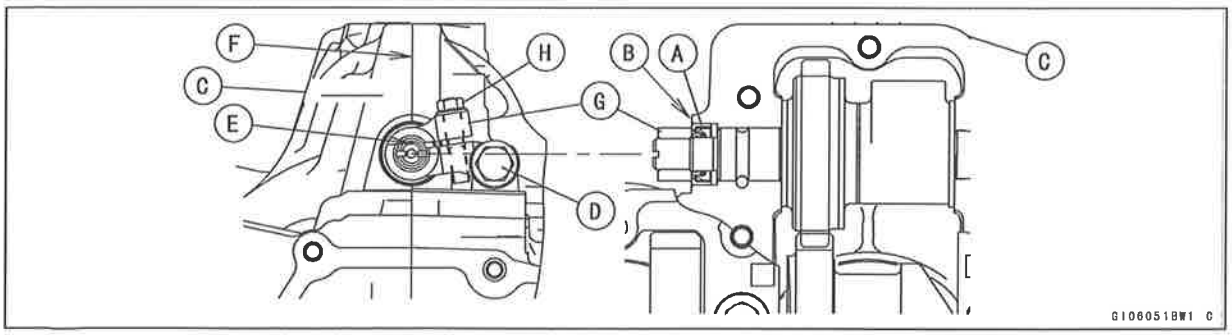
○Fill the oil seal lips with grease.

- Install the balancer shaft clamp lever.
- Tighten:

Torque - Balancer Shaft Clamp Lever Bolt [D]: 25 N·m (2.5 kgf·m, 18 ft·lb)

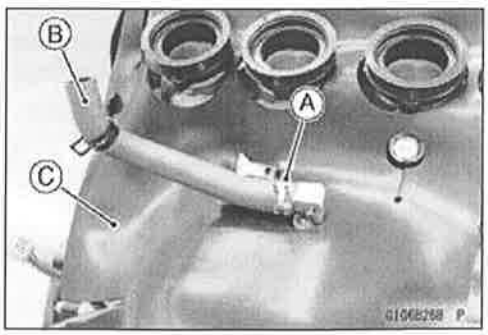
- Turn the balancer shaft so that its mark [E] is aligned with the crankcase mating line [F].
- Check that the lever [G] is in contact with the crankcase.
- Tighten:

Torque - Balancer Shaft Clamp Bolt [H]: 9.8 N·m (1.0 kgf·m, 87 in·lb)



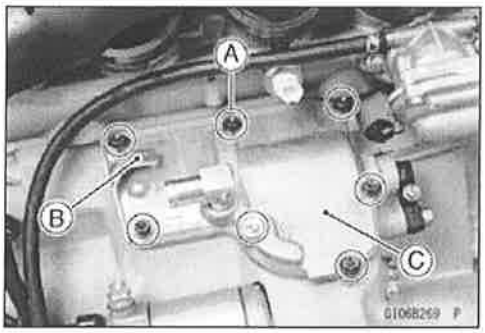
Rear Balancer Removal

- Remove:
  Engine (see Engine Removal in the Engine Removal/Installation chapter)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System chapter)
- Slide the clamp [A] and remove the breather hose [B].
- Turn up the heat insulation rubber plate [C].

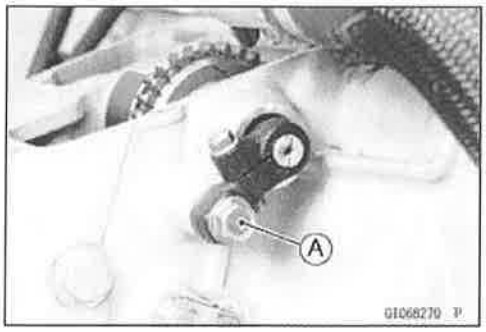


Balancer

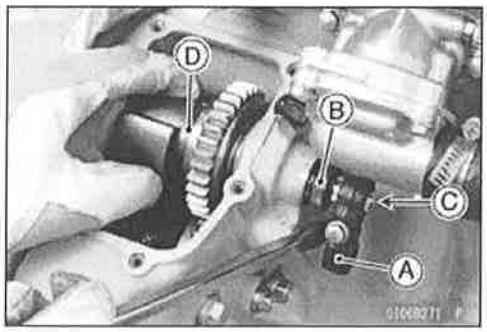
- Remove:
  Breather Cover Bolts [A]
  Bracket [B]
  Breather Cover [C]



- Remove the balancer shaft clamp lever bolt [A].

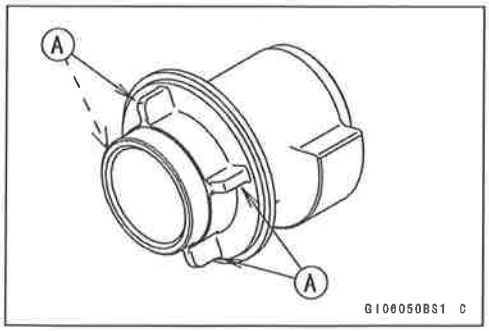


- Pry off the clamp lever [A] until the oil seal [B] removed.
- Pull the balancer shaft [C] out of the crankcase. The balancer weight and gear assembly [D] come off with needle bearings and copper washers.



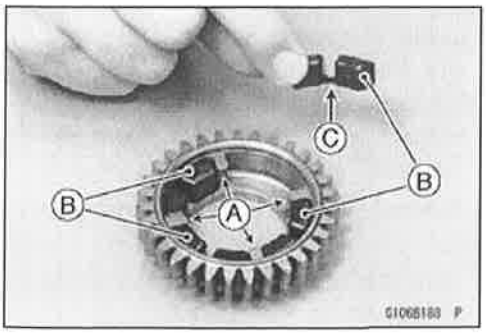
Rear Balancer Installation

- Apply molybdenum disulfide oil solution to the ribs [A] of the balancer.



- Apply molybdenum disulfide oil solution to the ribs [A] of the balancer gear.
- Check that the rubber dampers [B] are in place.

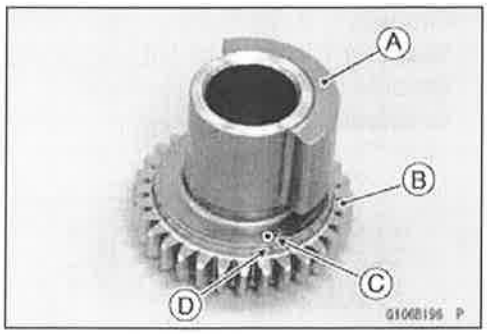
○Face the linked portion [C] to the bottom.



Balancer

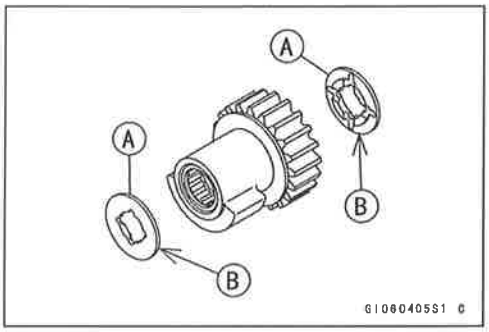
- Install the balancer weight [A] into the gear [B].

○Align the punch mark [C] of the balancer weight to the groove [D] of the gear.

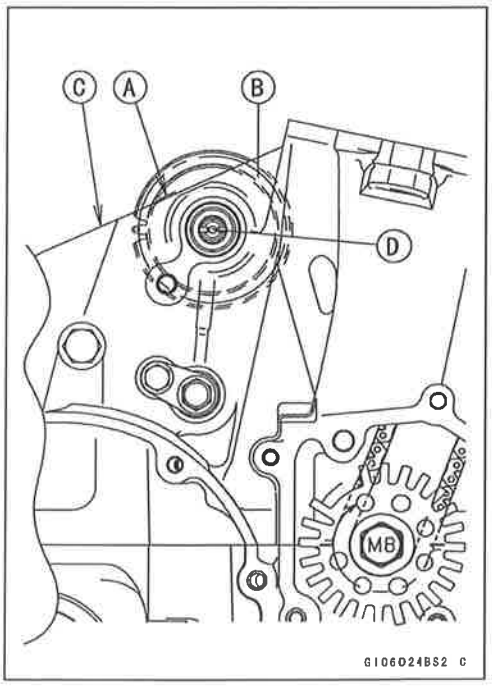


- Apply molybdenum disulfide oil solution to the needle bearings. Insert the needle bearings.
- Fit the copper washers [A] on both ends of the weight and gear assembly.

○The projected sides [B] face inward.



- Position the crankshaft at #2, 3 position TDC or at #1, 4 position TDC.
- Align the mark [A] on the balancer gear [B] with the mating surface [C] of the upper crankcase half.
- Apply molybdenum disulfide oil solution to the balancer shaft.
- Install the balancer shaft [D] and then align the balancer gear with the starter motor clutch gear.



- Install the new oil seal [A] so that its surface [B] is flush with the surface of crankcase [C].

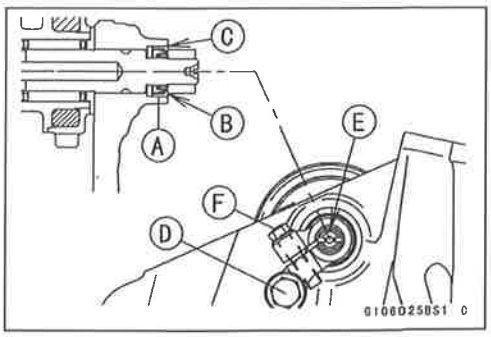
○Fill the oil seal lips with grease.

- Install the balancer shaft clamp lever.
- Tighten:

Torque - Balancer Shaft Clamp Lever Bolt [D]: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Turn the balancer shaft so that its mark [E] is in position as shown.
- Check that the lever is in contact with the crankcase.
- Tighten:

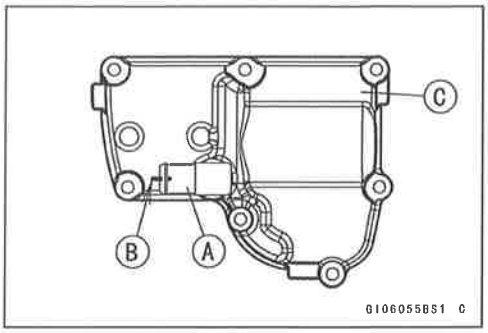
Torque - Balancer Shaft Clamp Bolt [F]: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Balancer

- When installing the fitting [A], note the following.

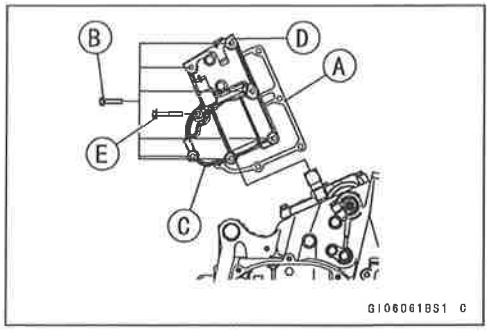
○Press the fitting so that it is aligned with the line [B] of the breather cover [C].



- Replace the breather cover gasket [A] with new ones.
- Apply a non-permanent locking agent to the breather cover bolts [B].
- Install:
  Breather Cover [C]
  Bracket [D]
- Tighten:

Torque - Breather Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

25 mm (0.98 in.) [B]
35 mm (1.38 in.) [E]



Balancer Adjustment

- Remove:
  Right Rear Middle Fairing (see Middle Fairing Removal in the Frame chapter)

NOTE

○*First, adjust the front balancer [A], next the rear balancer [B].*

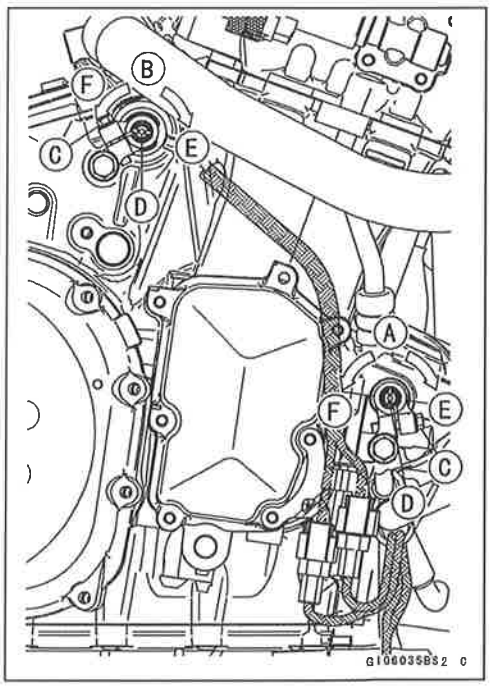
- Start the engine and warm it up thoroughly.
- Adjust the balancer gear backlash with the engine idling. The amount of backlash can be changed by turning the balancer shaft which has eccentric journals.

○Start the engine and let it idle.

○Loosen the clamp bolt [C] and turn the balancer shaft [D] clockwise [E] until the balancer gear makes a whining sound.

○Turn the shaft counterclockwise [F] until the balancer gear whining sound disappears and tighten the clamp bolt.

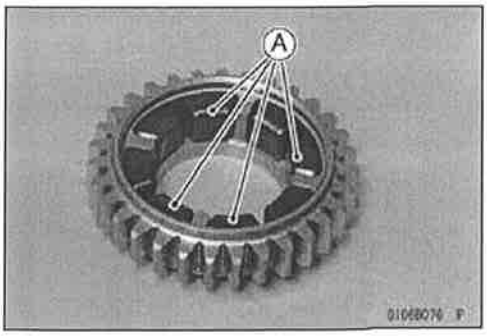
Torque - Balancer Shaft Clamp Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Balancer Damper Inspection

- Remove the balancer and disassemble the weight and gear assembly.
- Visually inspect the rubber dampers [A].

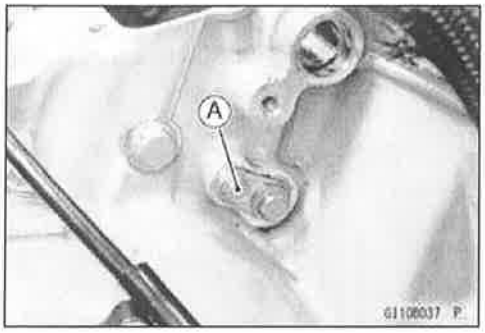
★If they appear damaged or deteriorated, replace them.



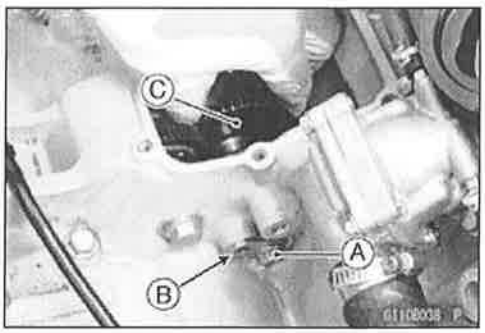
Starter Clutch and Torque Limiter

Starter Clutch Removal

- Remove:
  Engine (see Engine Removal in the Engine Removal/Installation chapter)
  Starter Motor (see Starter Motor Removal in the Electrical System chapter)
  Rear Balancer (see Rear Balancer Removal)
  Starter Clutch Shaft Plate Bolt [A]



- Pull the starter clutch shaft plate bolt [A] with the shaft plate [B] and starter clutch shaft holding the starter clutch [C].
- Remove the starter clutch.

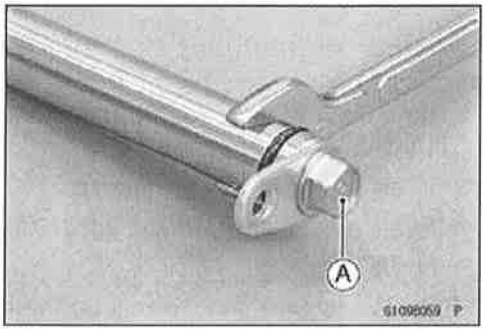


Starter Clutch Installation

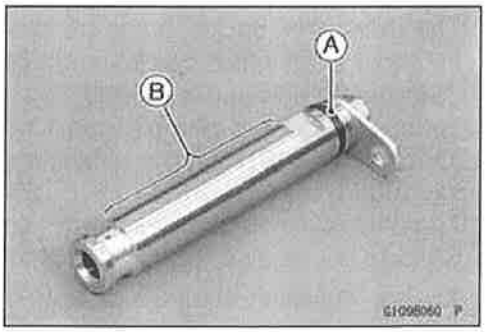
★If the shaft bolt [A] removed, replace the bolt with a new one and hold the shaft to tighten it.

- Apply a non-permanent locking agent to the threads of the shaft bolt.

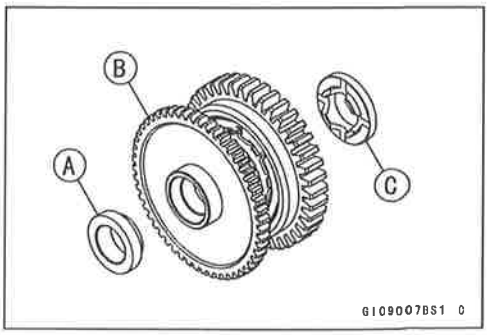
Torque - Starter Clutch Shaft Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)



- Replace the O-ring [A] with a new one.
- Apply molybdenum disulfide grease [B] to the starter clutch shaft.



- Assemble:
  Collar (Long) [A]
  Starter Clutch [B]
  Collar (Short) [C]



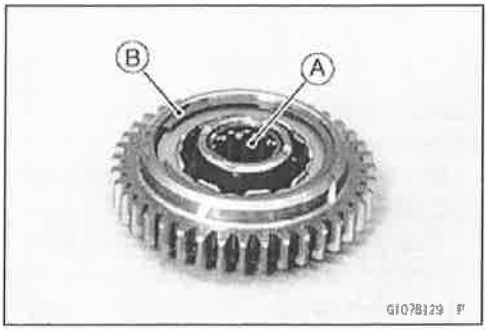
Starter Clutch and Torque Limiter

- Align the starter clutch gear with the torque limiter gear.
- Insert the starter clutch shaft.
- Apply a non-permanent locking agent to the starter clutch shaft plate bolt.
- Tighten:

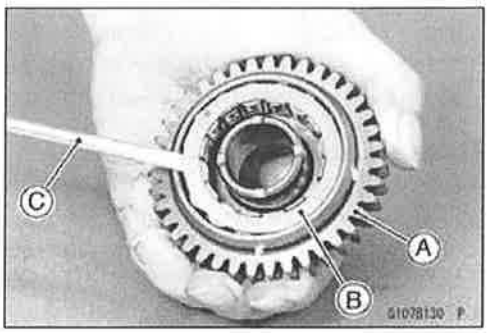
Torque - Starter Clutch Shaft Plate Bolt : 9.8 N·m (1.0 kgf·m, 87 in·lb)

Starter Motor Clutch Disassembly

- Remove the starter motor clutch (see Starter Motor Clutch Removal).
- Pull the driven gear out off from the drive gear.
- Remove the needle bearing [A] and snap ring [B].

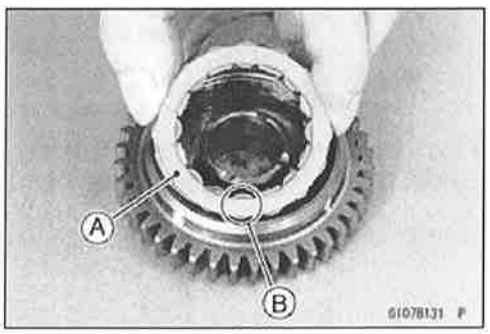


- Holding the drive gear [A] with a hand, remove the one -way clutch [B] from the gear by using the flat tip screw-driver [C].

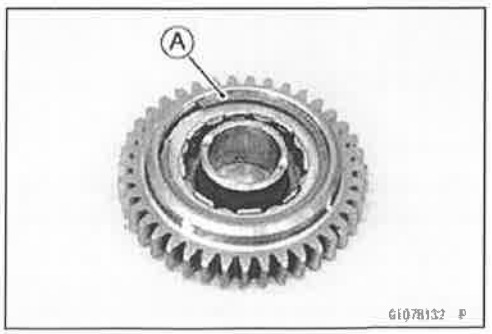


Starter Motor Clutch Assembly

- Be sure to install the one-way clutch [A] so that its arrow [B] faces the side of the snap ring.

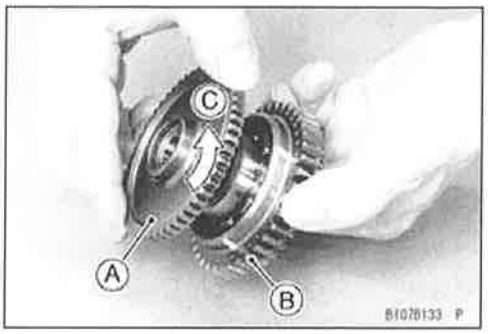


- Install the new snap ring [A] to the one-way clutch.



Starter Clutch and Torque Limiter

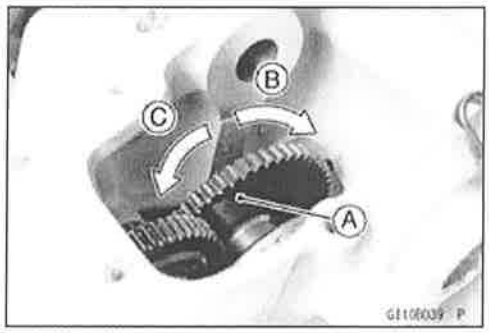
- Turn in the driven gear [A] to the drive gear [B]. Counterclockwise [C]
- Install the needle bearing.



Starter Clutch Inspection

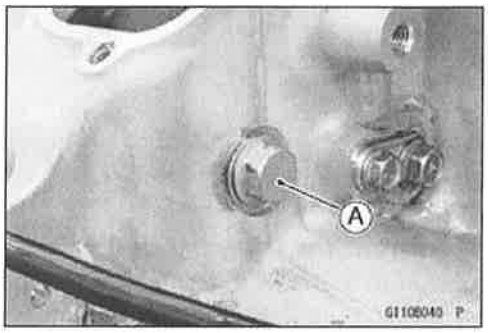
- Remove:
  Starter Motor (see Stater Motor Removal in the Electrical System chapter)
  Rear Balancer (see Rear Balancer Removal)
- Turn the starter idle gear [A] by hand. The starter idle gear should turn forward [B] freely, but should not turn backward [C].

★If the clutch does not operate as it should or if it makes noise, disassemble the starter clutch, examine each part visually, and replace any worn or damaged parts.

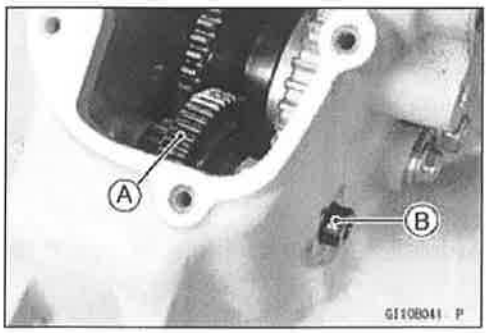


Torque Limiter Removal

- Remove:
  Rear Balancer (see Rear Balancer Removal)
  Starter Motor (see Starter Motor Removal in the Electrical chapter).
- Remove the torque limiter bolt [A] with washer.



- Holding the torque limiter [A], remove the torque limiter shaft [B] and the torque limiter.



Torque Limiter Installation

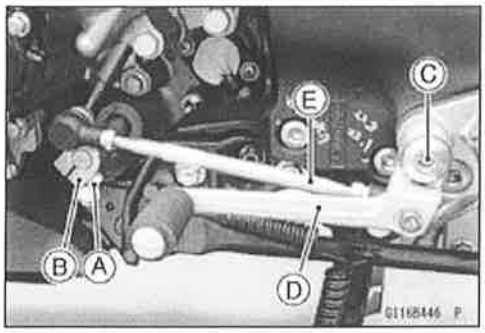
- Replace the washer with a new one.
- Apply molybdenum disulfide grease to the torque limiter shaft.
- Apply a non-permanent locking agent to the limiter bolt.
- Tighten:

Torque - Torque Limiter Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

External Shift Mechanism

Shift Pedal Removal

- Remove:
  Shift Lever Bolt [A]
  Shift Lever [B]
  Shift Pedal Mounting Bolt [C]
  Washers
  Shift Pedal [D] with Tie-rod [E]

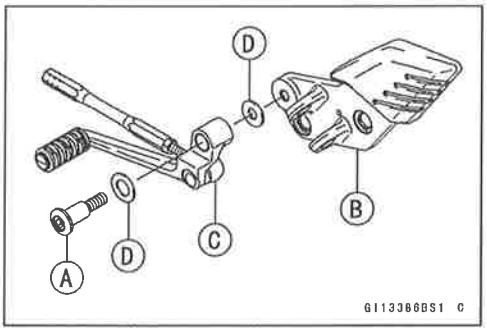


Shift Pedal Installation

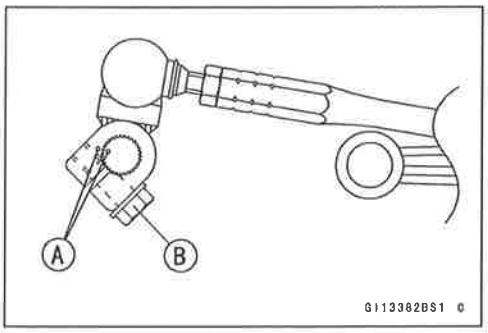
- Tighten:

Torque - Shift Pedal Mounting Bolt [A]: 25 N·m (2.5 kgf·m, 18 ft·lb)

Footpeg Bracket [B]
Shift Pedal [C]
Washers [D]

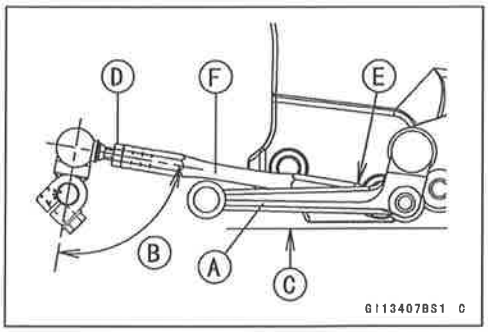


- Install the shift lever so that align the punch marks [A].
- Tighten the shift lever bolt [B] securely.



- Install the shift pedal [A] as shown.
  About 90° [B]
  About Horizontally [C]

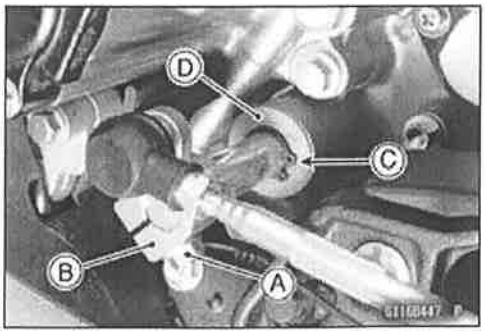
○To adjust the pedal position, loosen the front locknut [D] (left-hand threads) and rear locknut [E] and then turn the tie-rod [F].



External Shift Mechanism Removal

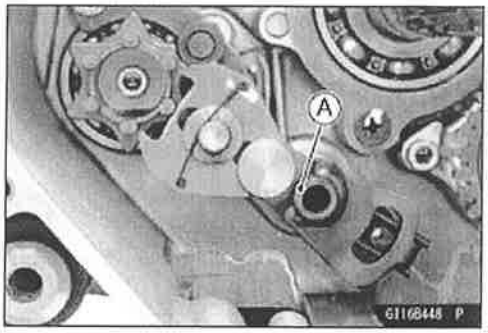
- Remove:
  Shift Lever Bolt [A]
  Shift Lever [B]
  Snap Ring [C]
  Washer [D]

Special Tool - Outside Circlip Pliers: 57001-144

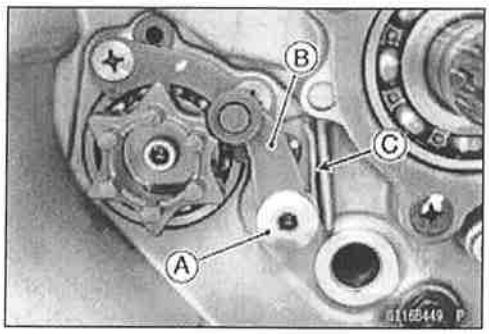


External Shift Mechanism

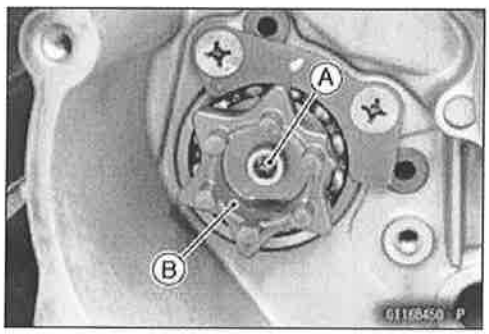
- Remove:
  Clutch (see Clutch Removal in the Clutch chapter)
  Shift Shaft Assembly [A]
  Washer



- Remove:
  Gear Positioning Lever Bolt [A]
  Gear Positioning Lever [B]
  Collar and Spring [C]



- Remove:
  Shift Drum Cam Holder Bolt [A]
  Shift Drum Cam [B]



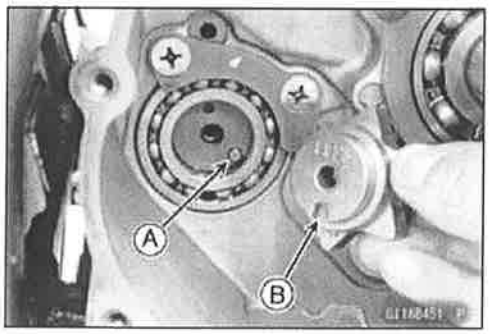
External Shift Mechanism Installation

- Be sure to install the dowel pin [A].

○Fit the dowel pin with the groove [B] of the shift drum cam.

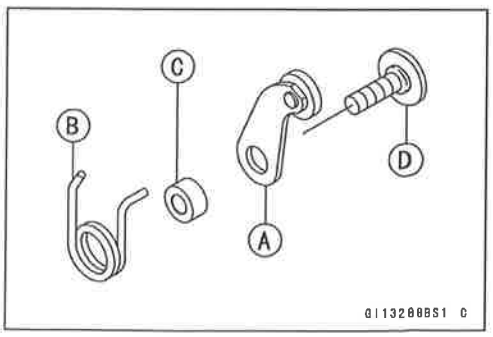
- Apply a non-permanent locking agent to the threads of the shift drum cam holder bolt, and tighten it.

Torque - Shift Drum Cam Holder Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)



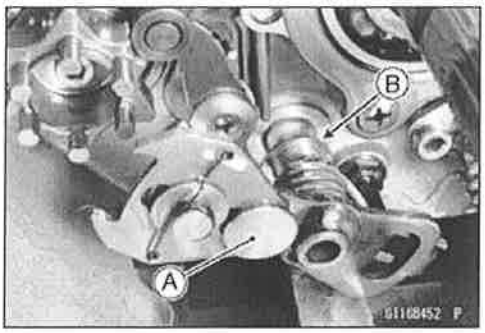
- Install the gear positioning lever [A] as shown.
  Spring [B]
  Collar [C]
  Bolt [D]
- Tighten:

Torque - Gear Positioning Lever Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)

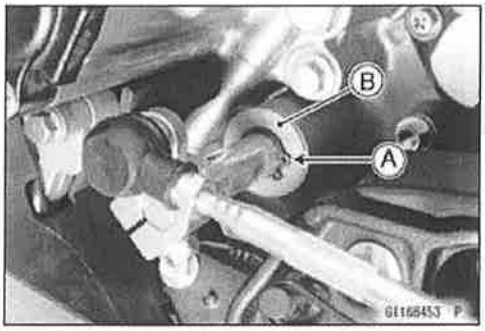


External Shift Mechanism

- Replace the oil seal with a new one.
- Apply grease to the lip of the oil seal.
- Install the shift shaft assembly [A] with washer [B].



- Replace the snap ring [A] with a new one.
- Install:
  Washer [B]
  Snap Ring
- Install the removed parts (see appropriate chapters).



External Shift Mechanism Inspection

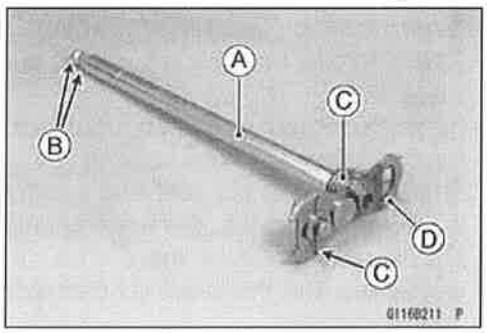
- Examine the shift shaft [A] for any damage.

★If the shaft is bent, straighten or replace it.

★If the serrations [B] are damaged, replace the shaft.

★If the springs [C] are damaged in any way, replace them.

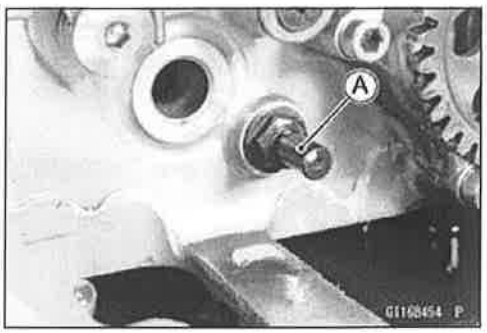
★If the shift mechanism arm [D] is damaged in any way, replace the arm.



- Check the return spring pin [A] is not loose.

★If it is loose, replace the shift shaft return spring pin with a new one, and tighten it.

Torque - Shift Shaft Return Spring Pin: 29 N·m (3.0 kgf·m, 21 ft·lb)

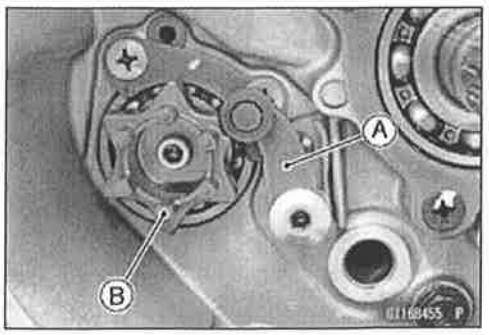


- Check the gear positioning lever [A] and its spring for breaks or distortion.

★If the lever or spring are damaged in any way, replace them.

- Visually inspect the shift drum cam [B].

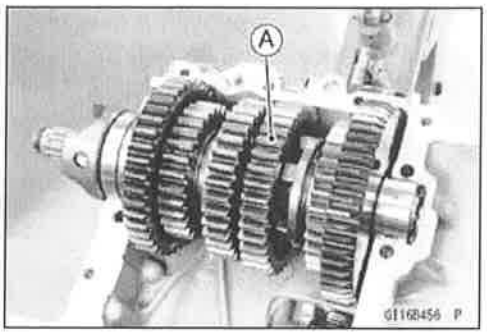
★If they are badly worn or if they show any damage, replace it.



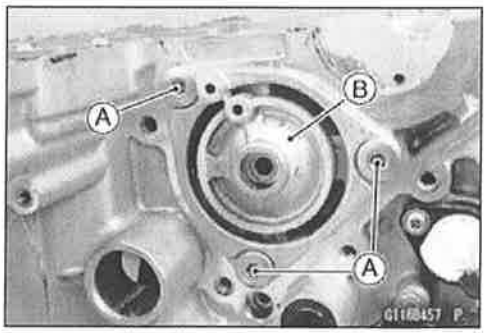
External Shift Mechanism

Transmission Shaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the output shaft [A].



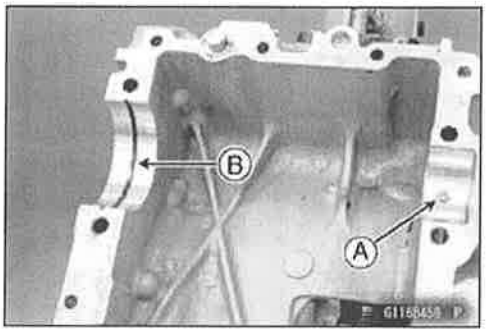
- Remove the shift forks (see Shift Drum and Fork Removal).
- Remove the cover bolts [A] and cover [B].
- Pull out the drive shaft.



Transmission Shaft Installation

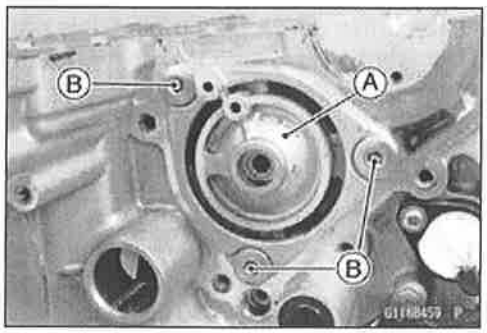
- Check to see that the set pin [A] and set ring [B] are in place.
- Install the output shaft into the upper crankcase half.
- Apply engine oil to the bearing.

○The bearing set pin and ring must match properly with the hole or groove in the bearing outer races. When they are properly matched, there is no clearance between the crankcase and the bearing outer races.



- Install the drive shaft into the lower crankcase half.
- Install the cover [A].
- Apply a non-permanent locking agent to the drive shaft cover bolts and tighten them.

Torque - Drive Shaft Cover Bolts [B]: 25 N·m (2.5 kgf·m, 18 ft·lb)



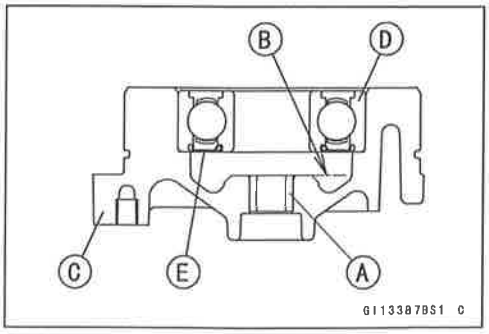
★If the cover disassembled, install the bearing and bushing as shown.

- Press in the bushing [A] into cover [C] so that the surface of the bushing is flush with the bottom surface [B] of the cover.
- Press in the bearing [D] until they are bottomed.

NOTE

○*Install the bearing so that sealed side [E] faces in.*

- Assemble the crankcase.



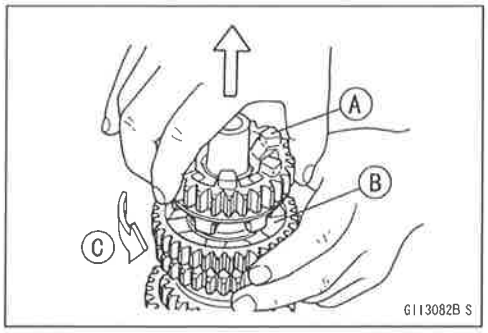
External Shift Mechanism

Transmission Shaft Disassembly

- Remove the transmission shafts (see Transmission Shaft Removal).
- Remove the circlips, disassemble the transmission shafts.
- The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear.

○Set the output shaft in a vertical position holding the 3rd gear [B].

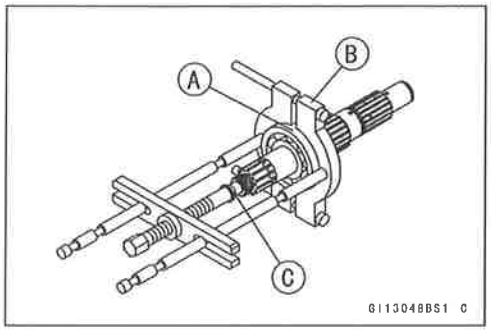
○Spin the 5th gear quickly [C] and pull it off upward.



- Remove the ball bearing [A] from output shaft.

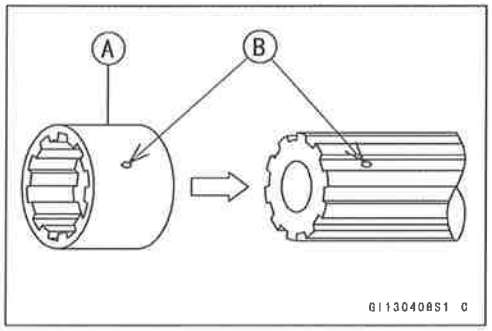
Special Tools - Bearing Puller [B]: 57001-135
Bearing Puller Adapter [C]: 57001-317

- Discard the bearing.

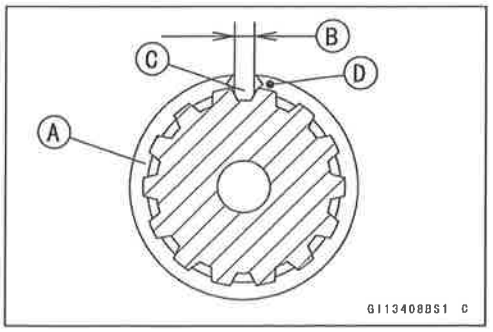


Transmission Shaft Assembly

- Apply molybdenum disulfide oil to the sliding surfaces of the shafts.
- Install the gear bushings [A] on the shaft with their holes [B] aligned.



- Replace any circlips removed with new ones.
- Install the circlips [A] so that the opening [B] of it is aligned with spline grooves [C].
- Install the circlips so that the mark [D] on them faces to each gear side.



- For assemble the drive shaft.

○Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.

○Install the 3rd/4th gear onto the drive shaft with their oil holes aligned.

○Install the 6th gear bushing onto the drive shaft with their oil holes aligned.

- For assemble the output shaft.

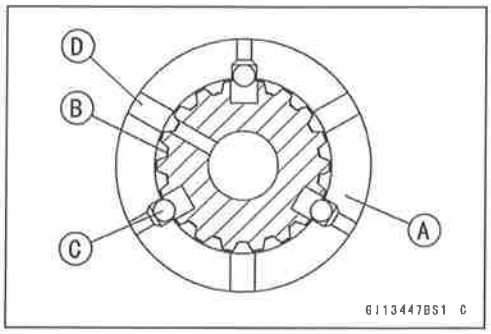
○Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.

○Install the 5th and 6th gears onto the output shaft with their oil holes aligned.

○Install the 3rd/4th gear bushings onto the output shaft with their oil holes aligned.

External Shift Mechanism

- Fit the steel balls into the 5th gear holes in the output shaft, aligning oil hole.
  5th Gear [A]
  Output Shaft [B]
  Steel Balls [C]
  Oil Hole [D]



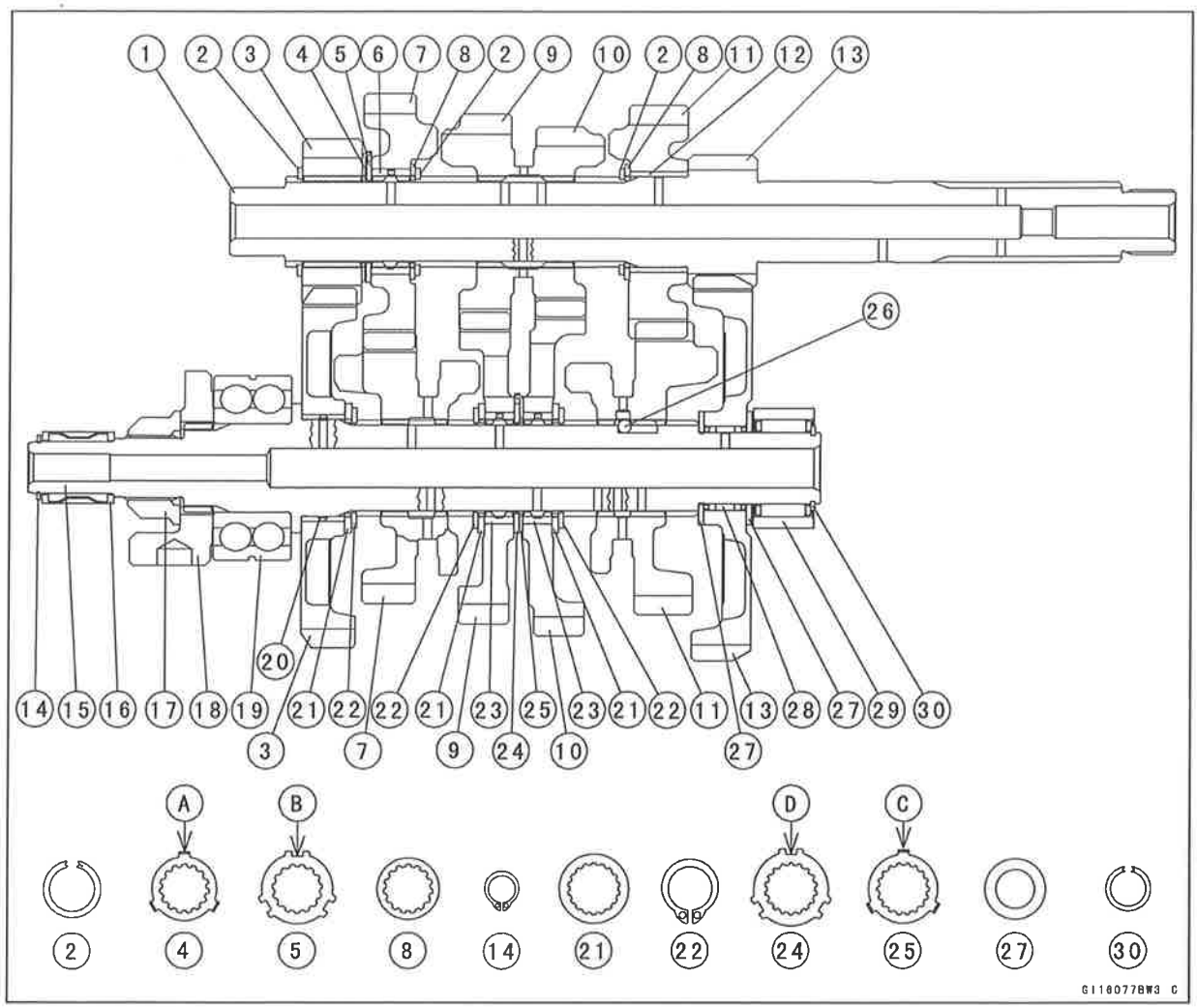
NOTICE

Do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

○After assembling the 5th gear with steel balls in place on the output shaft, check the ball-locking effect that the 5th gear doesn't come out of the output shaft when moving it up and down by hand.

- Check that each gear spins or slides freely on the transmission shafts without binding after assembly.

External Shift Mechanism



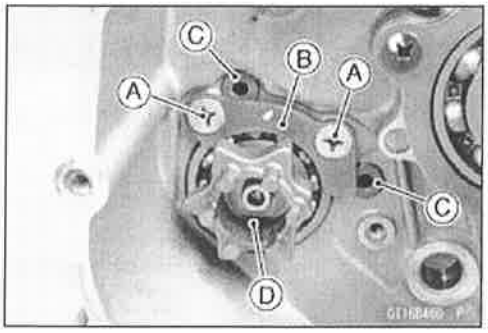
1. Drive Shaft
2. Circlip, ϕ33 mm (1.30 in.)
3. 2nd Gear
4. Toothed Washer, ϕ37 mm (1.46 in.)
5. Toothed Washer, ϕ40.5 mm (1.59 in.)
6. Bushing
7. 6th (Top) Gear
8. Toothed Washer, ϕ35.5 mm (1.40 in.)
9. 4th Gear
10. 3rd Gear
11. 5th Gear
12. Bushing
13. 1st Gear
14. Circlip, ϕ19.7 mm (0.776 in.)
15. Output Shaft
16. Needle Bearing
17. Dumper Cam Nut
18. Dumper Cam
19. Ball Bearing
20. Bushing
21. Toothed Washer, ϕ40 mm (1.18 in.)
22. Circlip, ϕ32.2 mm (1.27 in.)
23. Bushing
24. Toothed Washer, ϕ43 mm (1.69 in.)
25. Toothed Washer, ϕ39.7 mm (1.56 in.)
26. Steel Ball
27. Thrust Washer, ϕ35 mm (1.38 in.)
28. Needle Bearing
29. Needle Bearing
30. Circlip, ϕ25.5 mm (1.00 in.)

○When the tongues [C] of the toothed washer [25] shall be assembled, they shall be installed into the notches [D] of the toothed washer [24].

○When the tongues [A] of the toothed washer [4] shall be assembled, they shall be installed into the notches [B] of the toothed washer [5].

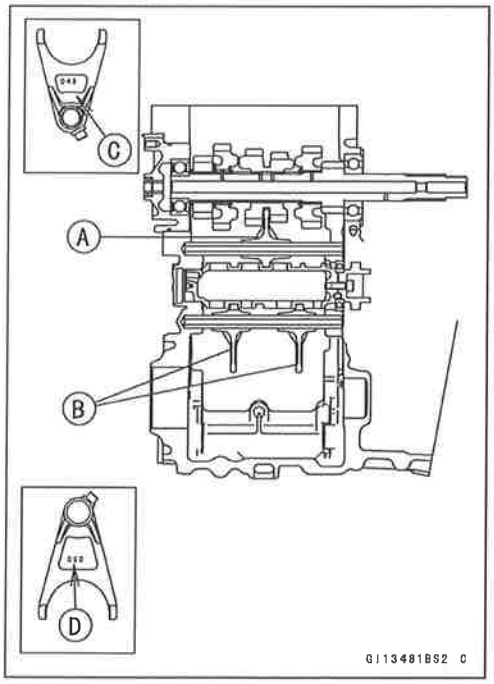
External Shift Mechanism

Shift Drum and Fork Removal



- Remove:
  Lower Crankcase Half (see Crankcase Splitting)
  External Shift Mechanism (see External Shift Mechanism Removal)
  Gear Position Switch (see Gear Position Switch Removal in the Electrical System chapter)
  Shift Drum Bearing Holder Bolts [A]
  Shift Drum Bearing Holder [B]
- Pull out the shift rods [C], and take off the shift forks.
- Pull out the shift drum [D].

Shift Drum and Fork Installation



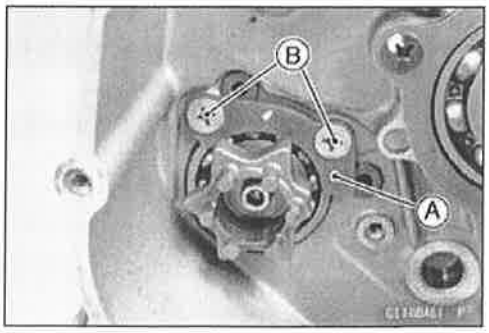
- Apply engine oil to the shift drum, forks and rods.
- Install the shift drum.
- Install the shift rods and shift forks as shown.

○Position the one with shortest ears [A] on the drive shaft and place the pin in the center groove in the shift drum.

○The two forks [B] on the output shaft are identical.

NOTE

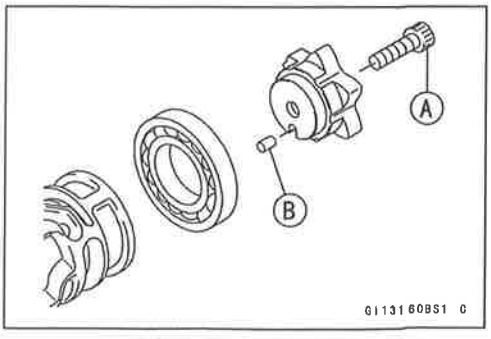
○*The forks have marks (046 [C], 050 [D]), and position them so that their marks face the engine left side.*



- Install the shift drum bearing holder [A] as shown.
- Apply a non-permanent locking agent to the shift drum bearing holder bolts [B].
- Tighten:

Torque - Shift Drum Bearing Holder Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

Shift Drum Disassembly



- Remove the shift drum (see Shift Drum and Fork Removal).
- While holding the shift drum with a vise, remove the shift drum cam holder bolt.
  Shift Drum Cam Holder Bolt [A]
  Dowel Pin [B]

External Shift Mechanism

Shift Drum Assembly

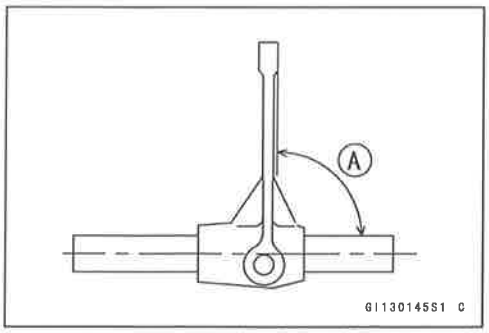
- Be sure to install the dowel pin.
- Apply a non-permanent locking agent to the threads of the shift drum cam holder bolt, and tighten it.

Torque - Shift Drum Cam Holder Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)

Shift Fork Bending Inspection

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.

90° [A]



Shift Fork/Gear Groove Wear Inspection

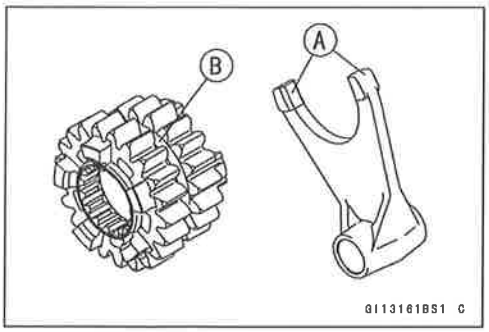
- Measure the thickness of the shift fork ears [A], and measure the width [B] of the gear grooves.

★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

Shift Fork Ear Thickness
Standard: 5.7 ~ 6.0 mm (0.22 ~ 0.24 in.)
Service Limit: 5.6 mm (0.22 in.)

★If the gear groove is worn over the service limit, the gear must be replaced.

Gear Groove Width
Standard: 6.05 ~ 6.15 mm (0.238 ~ 0.242 in.)
Service Limit: 6.3 mm (0.25 in.)



Shift Fork Guide Pin/Drum Groove Wear Inspection

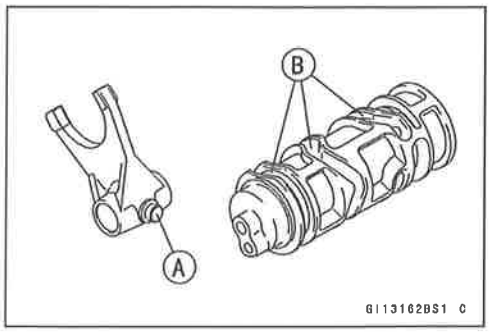
- Measure the diameter of each shift fork guide pin [A], and measure the width [B] of each shift drum groove.

★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter
Standard: 6.9 ~ 7.0 mm (0.27 ~ 0.28 in.)
Service Limit: 6.8 mm (0.27 in.)

★If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width
Standard: 7.05 ~ 7.20 mm (0.278 ~ 0.283 in.)
Service Limit: 7.3 mm (0.29 in.)

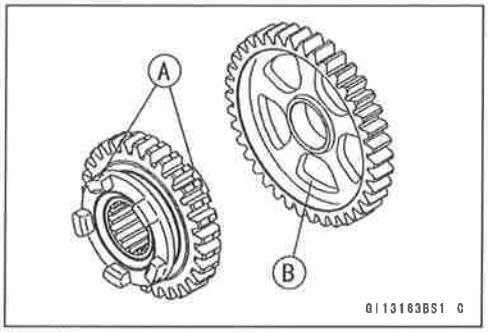


External Shift Mechanism

Gear Dog and Gear Dog Hole Damage Inspection

- Visually inspect the gear dogs [A] and gear dog holes [B].

★ Replace any damaged gears or gears with excessively worn dogs or dog holes.

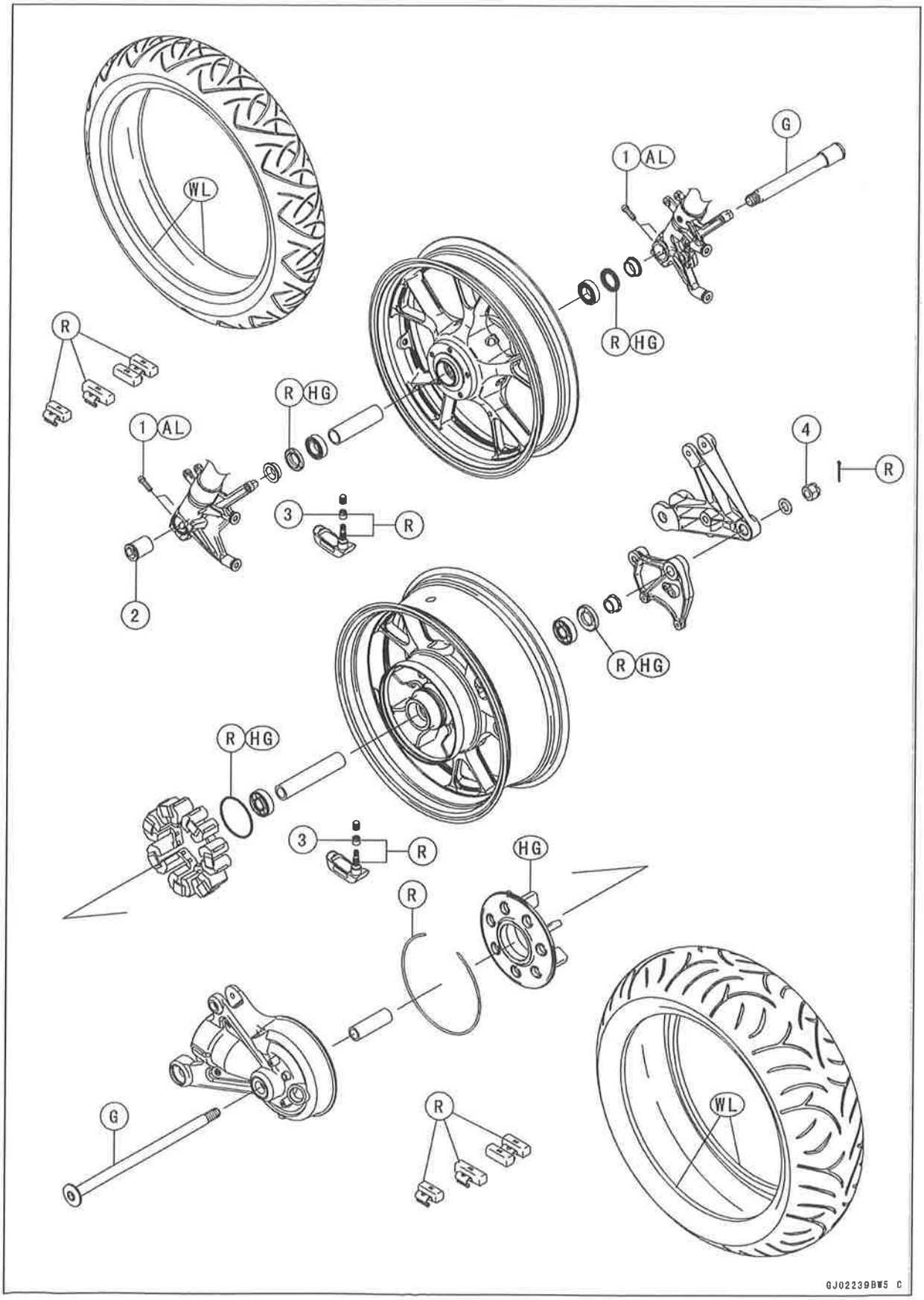


Wheels/Tires

Table of Contents

Exploded View 10-2
Specifications 10-4
Special Tools 10-5
Wheels (Rims) 10-6
  Front Wheel Removal 10-6
  Front Wheel Installation 10-7
  Rear Wheel Removal 10-8
  Rear Wheel Installation 10-9
  Wheel Coupling Removal 10-11
  Wheel Coupling Installation 10-11
  Wheel Inspection 10-12
  Axle Inspection 10-12
  Coupling Damper Inspection 10-13
  Balance Inspection 10-13
  Balance Adjustment 10-13
  Balance Weight Removal 10-13
  Balance Weight Installation 10-14
Tires 10-15
  Air Pressure Inspection/Adjustment 10-15
  Tire Inspection 10-15
  Tire Removal 10-15
  Tire Installation 10-16
  Tire Repair 10-19
Hub Bearing 10-20
  Hub Bearing Removal 10-20
  Hub Bearing Installation 10-20
  Hub Bearing Inspection 10-21
  Hub Bearing Lubrication 10-21

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle Clamp Bolts	20	2.0	15	AL
2	Front Axle Nut	130	13.3	95.9	
3	Front Tire Pressure Sensor Nut	12	1.2	106 in·lb	
4	Rear Axle Nut	130	13.3	95.9	

AL: Tighten the two clamp bolts alternately two time to ensure even tightening torque.
G: Apply grease.
HG: Apply high-temperature grease.
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Specifications

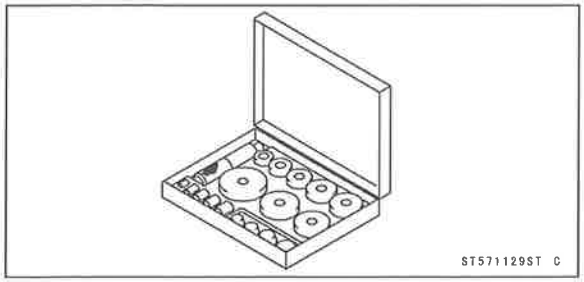
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	TIR 0.5 mm (0.02 in.) or less	TIR 1.0 mm (0.04 in.)
Radial	TIR 0.8 mm (0.03 in.) or less	TIR 1.0 mm (0.04 in.)
Axle Runout/100 mm (3.94 in.)	TIR 0.03 mm (0.001 in.) or less	TIR 0.2 mm (0.008 in.)
Wheel Balance	10 g (0.35 oz.) or less	– – –
Balance Weights	10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.06 oz.)	– – –
Rim Size:		
Front	J17M/C × MT3.50	– – –
Rear	J17M/C × MT6.00	– – –
Tires		
Air Pressure (when cold):		
Front	290 kPa (2.90 kgf/cm², 42 psi)	– – –
Rear	290 kPa (2.90 kgf/cm², 42 psi)	– – –
Tread Depth:		
Front	4.8 mm (0.19 in.)	1 mm (0.04 in.) (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	6.2 mm (0.24 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)
Standard Tires:	Make, Type	Size
Front	BRIDGESTONE, BATTLAX, BT021F RADIAL U	120/70 ZR17M/C (58W)
Rear	BRIDGESTONE, BATTLAX, BT021R RADIAL U	190/50 ZR17M/C (73W)
Replacement Tires:	Make, Type	Size
Front	BRIDGESTONE, BATTLAX SPORT TOURING T30F EVO	120/70 ZR17M/C (58W)
Rear	BRIDGESTONE, BATTLAX SPORT TOURING T30R	190/50 ZR17M/C (73W)

⚠ WARNING

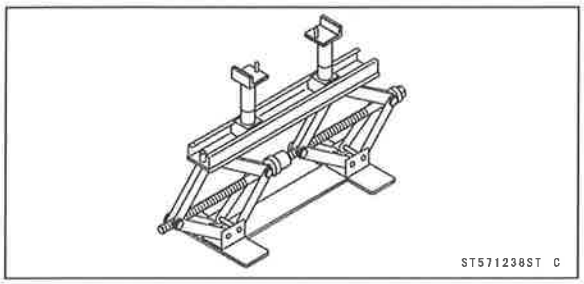
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Special Tools

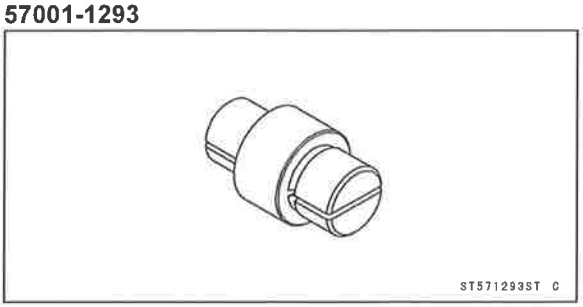
Bearing Driver Set:
57001-1129



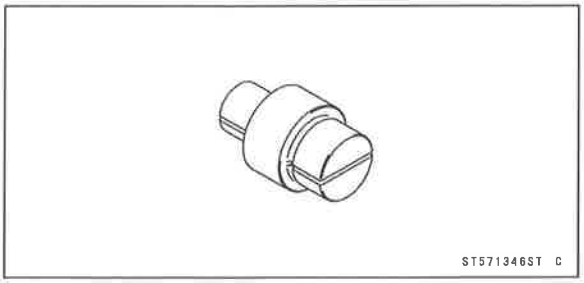
Jack:
57001-1238



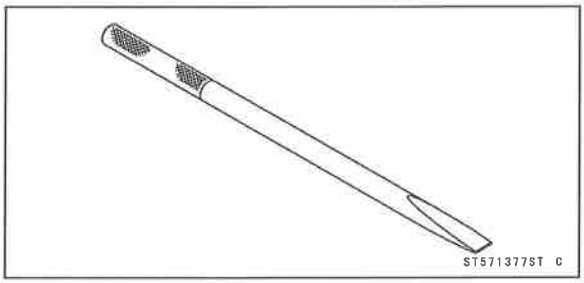
Bearing Remover Head, ϕ20 × ϕ22:
57001-1293



Bearing Remover Head, ϕ25 × ϕ28:
57001-1346



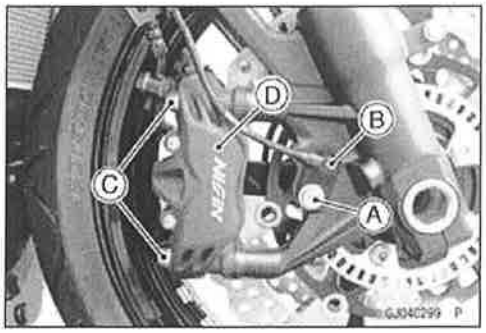
Bearing Remover Shaft, ϕ13:
57001-1377



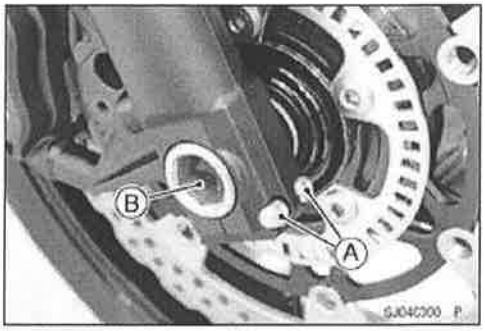
Wheels (Rims)

Front Wheel Removal

- Remove the front fender (see Front Fender Removal in the Frame chapter).
- Remove:
  Front Wheel Rotation Sensor Bolt [A]
  Front Wheel Rotation Sensor [B]
  Front Caliper Mounting Bolts [C] (Both Sides)
  Front Calipers [D] (Both Sides)

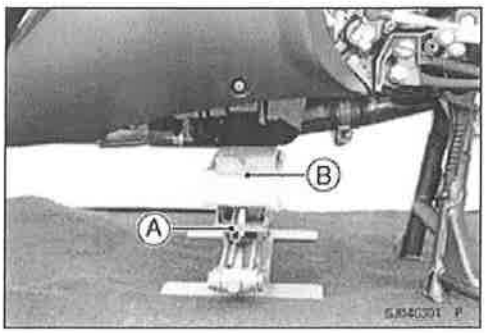


- Loosen:
  Front Axle Clamp Bolts (Right) [A]
  Front Axle [B]



- Use the center stand to support the motorcycle upright.
- Raise the front wheel off the ground with the jack [A].
  Wodden Block [B]

Special Tool - Jack: 57001-1238

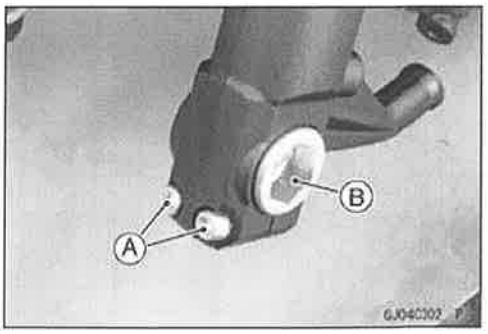


- Remove:
  Front Axle
  Front Wheel

NOTICE

Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

- Loosen the front axle clamp bolts (left) [A], and remove the axle nut [B].



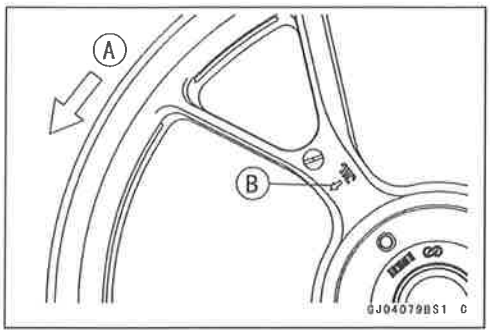
Wheels (Rims)

Front Wheel Installation

NOTE

○*The direction of the wheel rotation [A] is shown by an arrow [B] on the wheel spoke.*

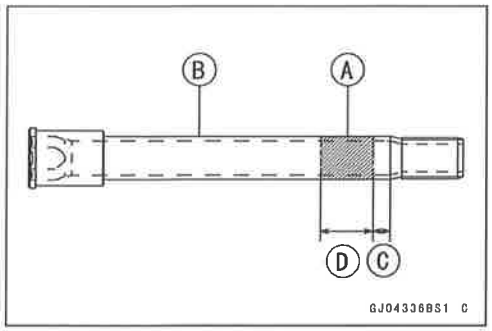
- Check the wheel rotation mark and install the front wheel.



- Apply a thin coat of grease [A] to the front axle [B] for rust prevention.
  About 10 mm (0.4 in.) [C]
  About 30 mm (1.2 in.) [D]

NOTE

○*Do not apply grease to the threads of the axle.*

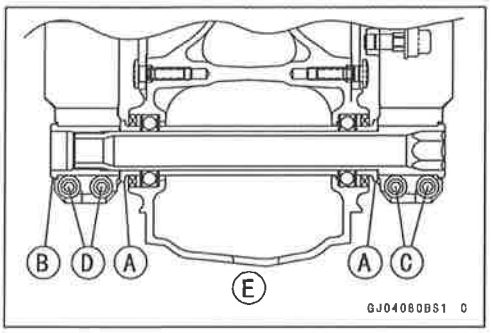


- Apply high-temperature grease to the grease seal lips.
- Fit the collars [A] on the both sides of the hub.

○The collars are identical.

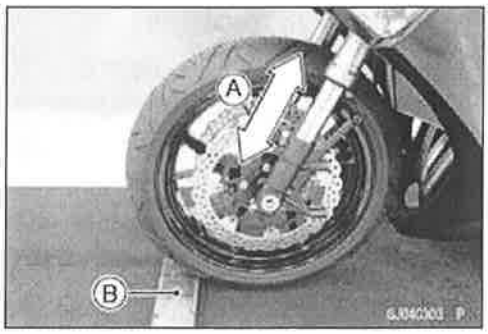
- Insert the front axle from the right side.
- Tighten the front axle nut [B].
  Front Axle Clamp Bolts (Right) [C]
  Front Axle Clamp Bolts (Left) [D]
  Viewed from Rear [E]

Torque - Front Axle Nut: 130 N·m (13.3 kgf·m, 95.9 ft·lb)



Wheels (Rims)

- Before tightening the front axle clamp bolts, pump the front fork up and down [A] 4 or 5 times to all on the right front fork leg to seat on the front axle.



NOTE

○Put a block [B] in front of the front wheel to stop moving.

- Tighten the front axle clamp bolts (right) first. Next, tighten the front axle clamp bolts (left).

Torque - Front Axle Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

NOTE

○Tighten the two clamp bolts alternately two times to ensure even tightening torque.

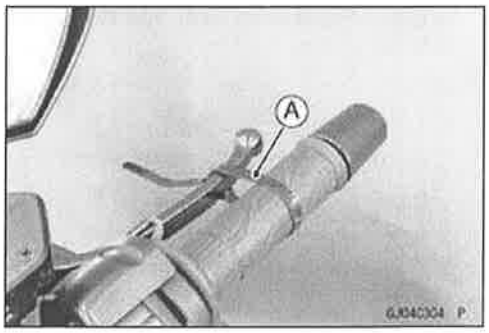
- Install:
  Front Calipers (see Front Caliper Installation in the Brakes chapter)
  Front Wheel Rotation Sensor (see Front Wheel Rotation Sensor Installation in the Brakes chapter)
- Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Rear Wheel Removal

- Use the center stand to support the motorcycle upright.
- Squeeze the brake lever slowly and hold it with a band [A].



⚠ WARNING

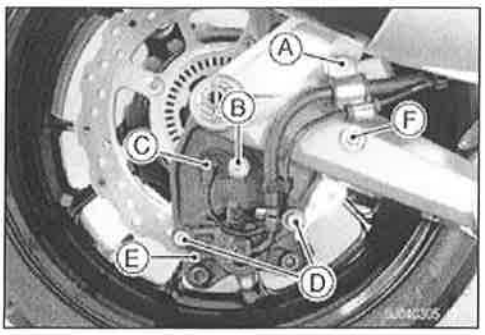
Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the rear wheel.

NOTICE

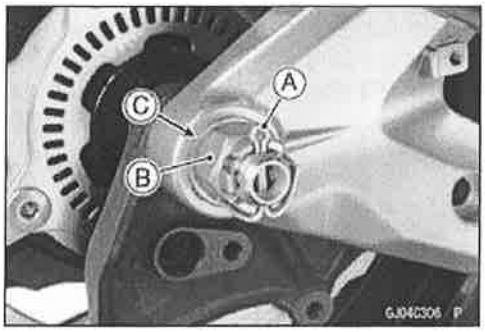
Be sure to hold the front brake when removing the rear wheel, or the motorcycle may fall over. The rear wheel or the motorcycle could be damaged.

Wheels (Rims)

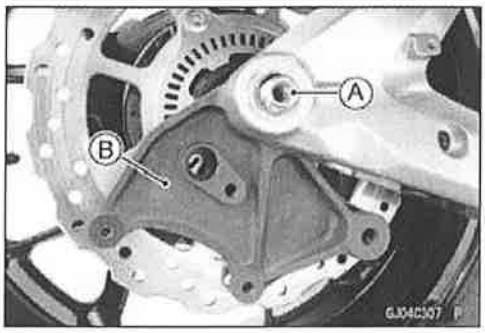
- Remove:
  Brake Hose Clamp Bolt [A]
  Rear Wheel Rotation Sensor Bolt [B]
  Rear Wheel Rotation Sensor [C]
  Rear Caliper Mounting Bolts [D]
  Rear Caliper [E]
  Caliper Bracket Bolt [F]



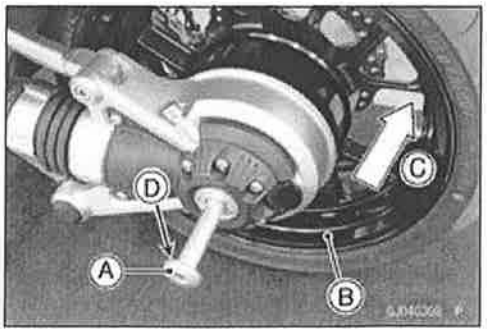
- Remove:
  Cotter Pin [A]
  Rear Axle Nut [B]
  Washer [C]



- Pull out the rear axle [A] to remove the caliper bracket [B].



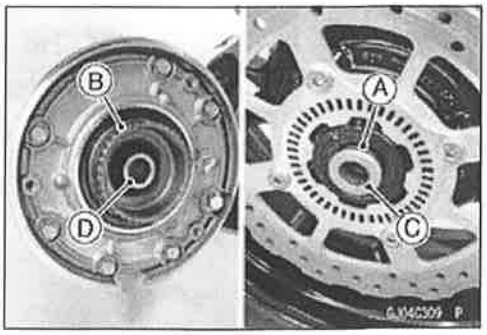
- Pull out the rear axle [A], and slide the rear wheel [B] toward the right [C] to disengage it from the final gear case.
  Washer [D]
- Remove the rear wheel rearward.



NOTICE
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Rear Wheel Installation

- Apply high-temperature grease:
  Grease Seal Lips [A]
- Apply molybdenum disulfide grease:
  Ring Gear Hub Splines [B]
- Fit the collars on the both sides of the hub.
  Right Side Collar [C]
  Left Side Collar [D]

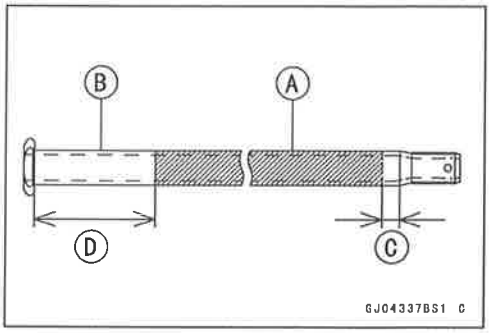


Wheels (Rims)

- Apply a thin coat of grease [A] to the rear axle [B] for rust prevention.
  About 10 mm (0.4 in.) [C]
  About 70 mm (2.8 in.) [D]

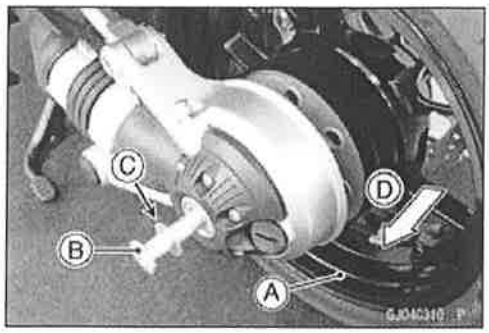
NOTE

○*Do not apply grease to the threads of the axle.*



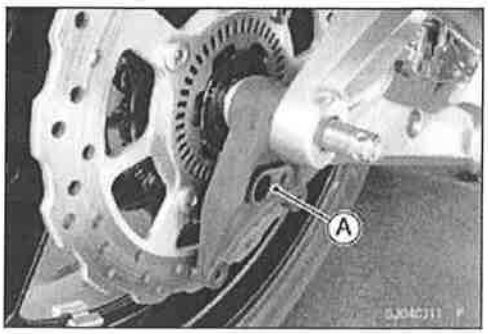
- Hold up the rear wheel [A], and insert the rear axle [B] together with the washer [C] from the left side.
- Slide [D] the rear wheel to the left side.

○Engage the ring gear hub splines with the wheel coupling hub splines.



- Pull the rear axle little and install the caliper bracket [A].
- Install the caliper bracket bolt temporarily.
- Tighten:

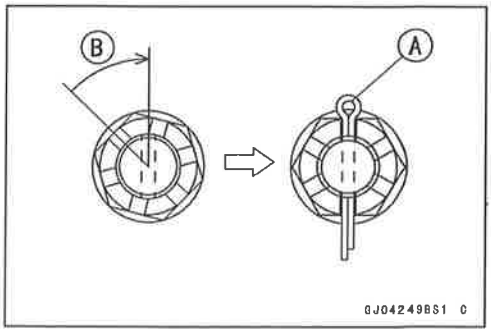
Torque - Rear Axle Nut: 130 N·m (13.3 kgf·m, 95.9 ft·lb)
Caliper Bracket Bolt: 65 N·m (6.6 kgf·m, 48 ft·lb)



- Insert a new cotter pin [A].

NOTE

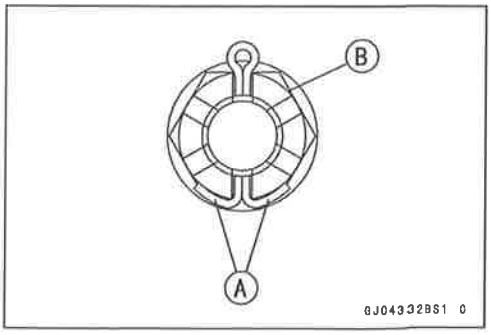
○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30 degrees.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*



- Bend the cotter pin [A] over the nut [B].

⚠ WARNING

A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.



Wheels (Rims)

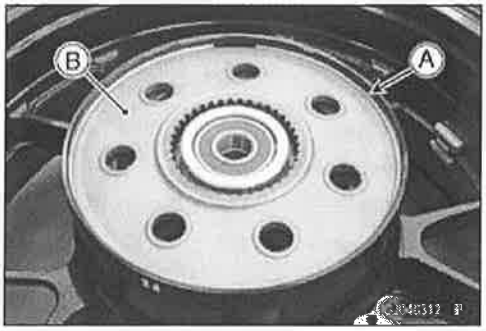
- Install:
  Rear Caliper (see Rear Caliper Installation in the Brake chapter)
  Rear Wheel Rotation Sensor (see Rear Wheel Rotation Sensor Installation in the Brake chapter)
- Check the rear brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

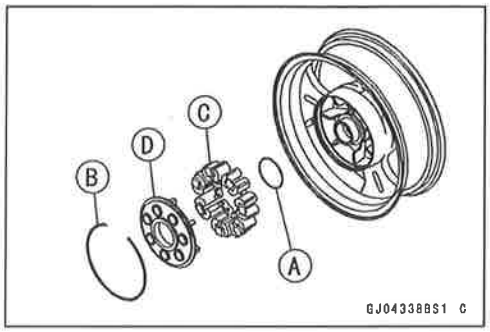
Wheel Coupling Removal

- Remove the rear wheel (see Rear Wheel Removal).
- Remove the coupling retaining ring [A].
- Remove the wheel coupling [B] with a bearing puller if necessary.



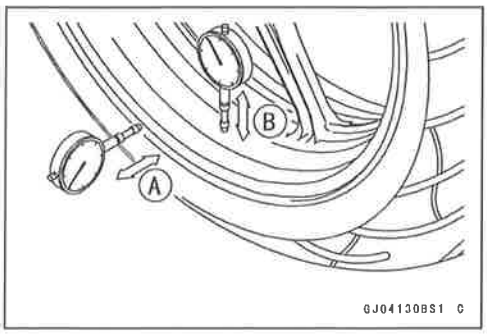
Wheel Coupling Installation

- Replace the O-ring [A] and the retaining ring [B].
- Grease the following:
  O-ring
- Install:
  Rubber Damper [C]
  Coupling [D]
  Retaining Ring



Wheels (Rims)

Wheel Inspection



- Raise the front/rear wheel off the ground.

Special Tools - Jack: 57001-1238

- Spin the wheel lightly, and check for roughness or binding.
- ★If roughness or binding is found, replace the hub bearings (see Hub Bearing Removal/Installation).
- Inspect the wheel for small cracks, dents, bending, or warp.
- ★If there is any damage to the wheel, replace the wheel.
- Remove the wheel, and support it with the tire by the axle.
- Measure the rim runout, axial [A] and radial [B], with a dial gauge.
- ★If rim runout exceeds the service limit, check the hub bearings (see Hub Bearing Inspection).
- ★If the problem is not due to the bearings, replace the wheel.

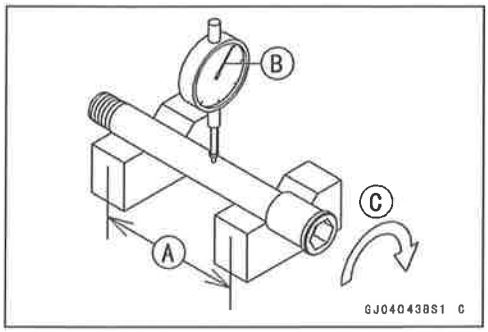
Rim Runout (with tire installed)

Standard:	
Axial	**TIR 0.5 mm (0.02 in.) or less**
Radial	**TIR 0.8 mm (0.03 in.) or less**
Service Limit:	
Axial	**TIR 1.0 mm (0.04 in.)**
Radial	**TIR 1.0 mm (0.04 in.)**

⚠ WARNING

Damaged wheel parts may fail and cause an accident resulting in serious injury or death. Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new one.

Axle Inspection



- Remove the front and rear axles (see Front/Rear Wheel Removal).
- Visually inspect the front and rear axle for damages.
- ★If the axle is damaged or bent, replace it.
- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.
- ★If axle runout exceeds the service limit, replace the axle.

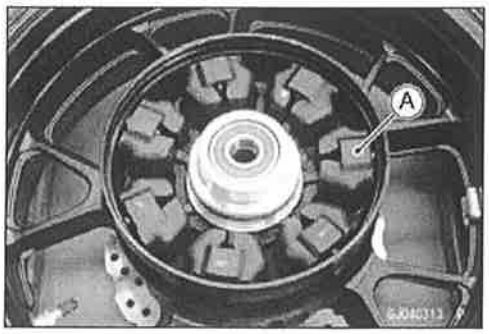
Axle Runout/100 mm (3.94 in.)

Standard:	**TIR 0.03 mm (0.001 in.) or less**
Service Limit:	**TIR 0.2 mm (0.008 in.)**

Wheels (Rims)

Coupling Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber damper [A].
- Replace the damper if it appears damaged or deteriorated.

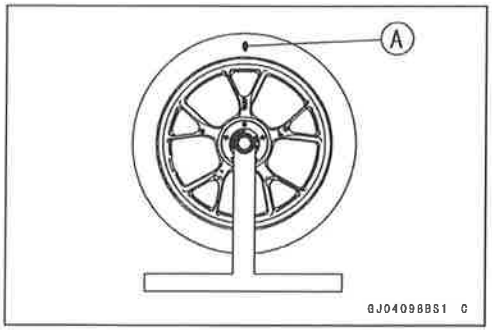


Balance Inspection

- Remove the front and rear wheels (see Front/Rear Wheel Removal).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

○Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.

★If the wheel always stops in one position, adjust the wheel balance (see Balance Adjustment).

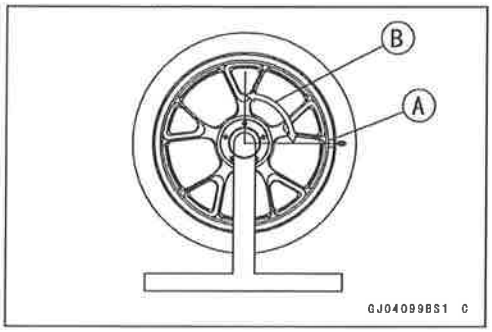


Balance Adjustment

- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.

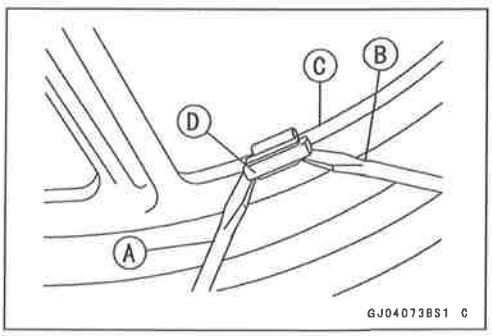
★If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated 1/4 turn.

- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weight.



Balance Weight Removal

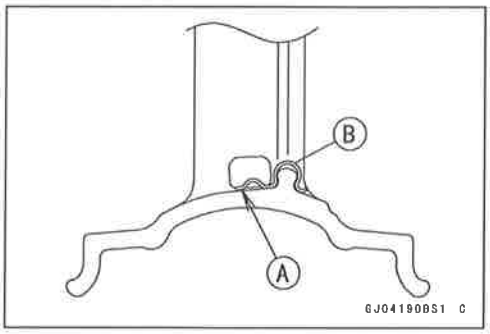
- Insert a flat tip screwdrivers [A] [B] between the rib [C] and weight [D] as shown.
- Pry the balance weight with two flat tip screwdrivers and remove the balance weight.
- Discard the used balance weight.



NOTICE
Do not tap the screwdrivers. The rim could be damaged.

Wheels (Rims)

Balance Weight Installation



- Check if the weight portion has any play on the blade [A] and clip [B].

★If it does, discard it.

⚠ WARNING

Unbalanced wheels can create an unsafe riding condition. If the balance weight has any play on the rib of the rim, the blade and/or clip have been stretched. Replace the loose balance weight. Do not reuse used balance weight.

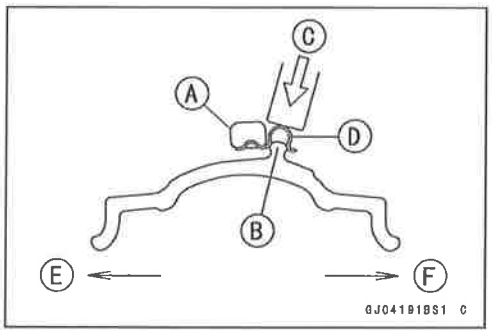
Balance Weight

Part Number	Weight
41075-0007	10 g (0.35 oz.)
41075-0008	20 g (0.71 oz.)
41075-0017	30 g (1.06 oz.)

NOTE

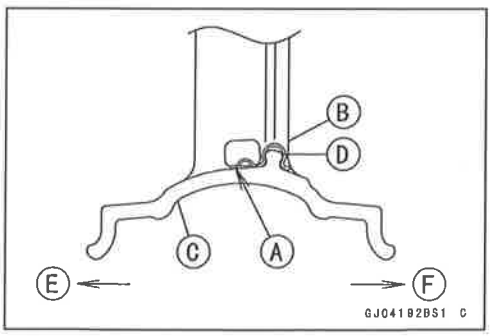
○*Balance weights are available from Kawasaki dealers in 10, 20, and 30 grams (0.35 oz., 0.71 oz., and 1.06 oz.) sizes. An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.*

○*Do not use four or more balance weight (Front: more than 70 gram, 2.5 oz. Rear more than 90 gram, 3.2 oz.). If the wheel requires an excess balance weight, disassemble the wheel to find the cause.*



- Slip the balance weight [A] on to the rib [B], by pushing or lightly hammering [C] the clip [D].

○Install the balance weight at the left side of the motorcycle.
Left Side [E]
Right Side [F]



- Check that the blade [A] and clip [B] are fully seated on the rim [C] and that the clip is hooked over the rib [D].
Left Side [E]
Right Side [F]

Tires

Air Pressure Inspection/Adjustment

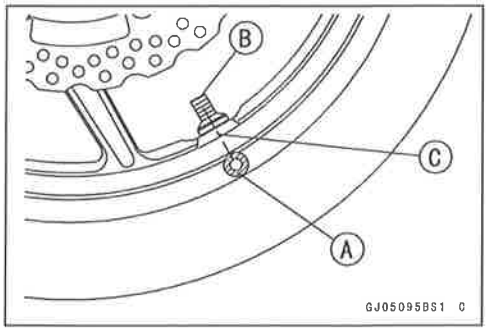
- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

Tire Inspection

- Refer to the Wheel/Tire Damage Inspection in the Periodic Maintenance chapter.

Tire Removal

- Remove:
  Wheel (see Front/Rear Wheel Removal)
  Valve Core (Let out the air)
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
  Chalk Mark or Yellow Mark [A]
  Air Valve [B]
  Align [C]



- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

NOTICE
Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.

- Remove the tire from the rim using a suitable commercially available tire changer. Note the following.

NOTE

○*The tires cannot be removed with hand tools because they fit the rims too tightly.*

○Lightly break the air valve portion [A] of the bead.

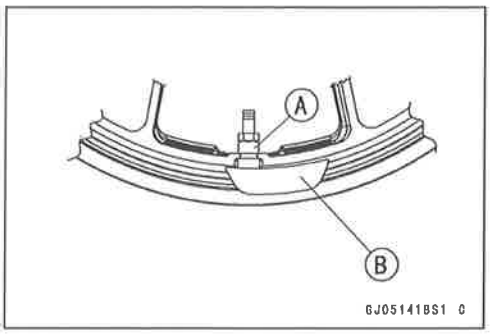
NOTICE
Do not deep break the air valve portion of the bead to prevent damage to the tire pressure sensor.

○Step on the side of the tire opposite the air valve, and start plying the tire off the rim near the air valve [A] with tire lever.

NOTICE
Be careful not to scratch the tire pressure sensor. Any scratch may damage sensor.

Tires

○Pull the opposite bead of the tire upward.
○Unscrew the nut [A] and remove the tire pressure sensor [B].



○Step on the side of the tire opposite the air valve, and start plying the tire off the rim near the air valve with tire iron.

Tire Installation

⚠ WARNING

Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.

- Visually inspect the sensor [A] for cuts and cracks.

★If it is damaged, replace it with a new one.

- When the sensor removed, replace it with a new one to secure the seal nature.

Tires

NOTE

○Replace the tire pressure sensor with the correct part according to the table below.

Tire Pressure Sensor Identication

Part Number	Hertz	Specification
21176-0746	433 MHz	AU, CN, PH, TH, MY, EUR, SEA-B3
21176-0748	315 MHz	US, CA, CAL, SEA-B1, SEA-B2

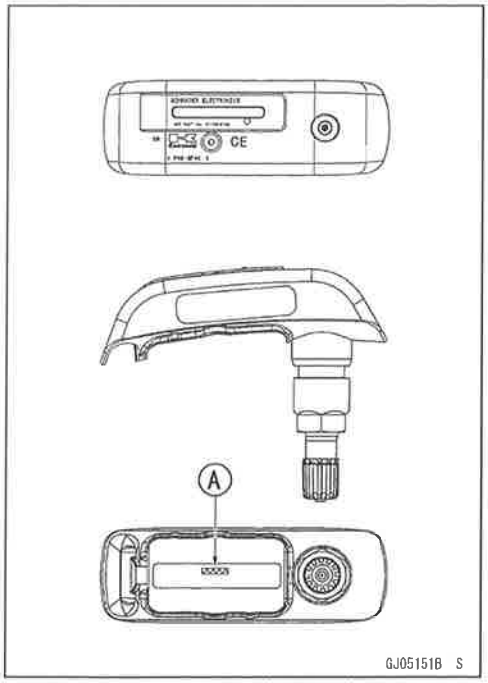
NOTE

○To replace an tire pressure sensor, KDS3 must be used to register the new sensor ID [A].
○To register the new sensor ID, for note the following.

When registering the sensor ID, add the 0 (zero) to left side so that the total digit number is eight numbers and/or letters.

<Example>

ID Mark of Part	ID Mark for Registering
F4391	000F4391 (eight-digit number)
4C4D65	004C4D65 (eight-digit number)

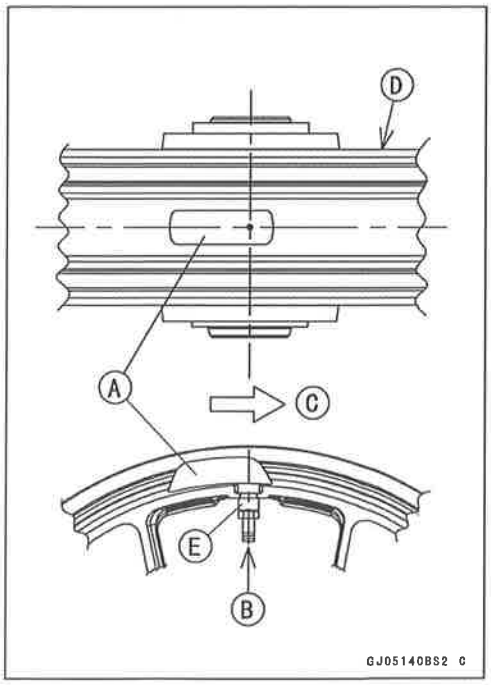


- Install the tire sensor [A] so that its valve [B] faces the rotating direction [C] and its position parallel to the rim line [D].

Torque - Tire Pressure Sensor Nut [E]: 12 N·m (1.2 kgf·m, 106 in·lb)

NOTE

○Internal tire sealants or repair products can cause damage to the tire pressure sensor(s) and should not be used.



Tires

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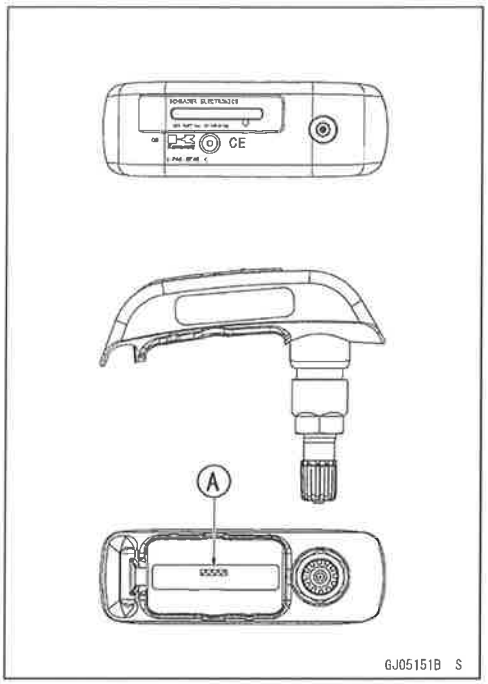
<Example>

ID Mark of Part	ID Mark for Registering
F4391	000F4391 (eight-digit number)
4C4D65	004C4D65 (eight-digit number)

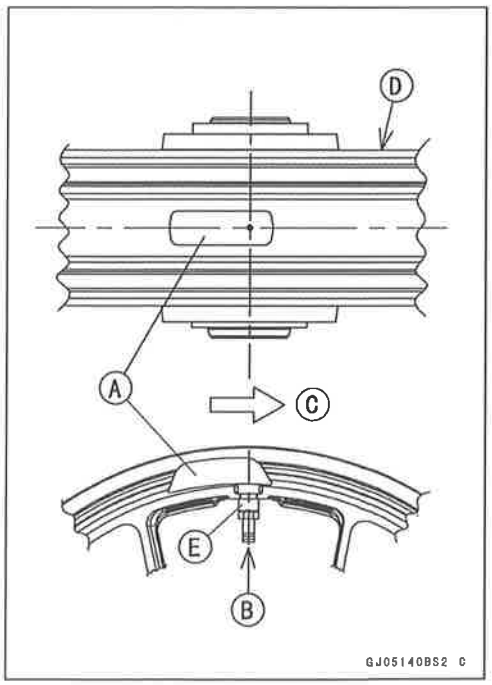


- Install the tire sensor [A] so that its valve [B] faces the rotating direction [C] and its position parallel to the rim line [D].

Torque - Tire Pressure Sensor Nut [E]: 12 N·m (1.2 kgf·m, 106 in·lb)

NOTE

○*Internal tire sealants or repair products can cause damage to the tire pressure sensor(s) and should not be used.*



Tires

- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.

⚠ WARNING

Overinflating a tire can cause it to explode, causing serious injury or death. Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm^2, 57 psi).

- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.

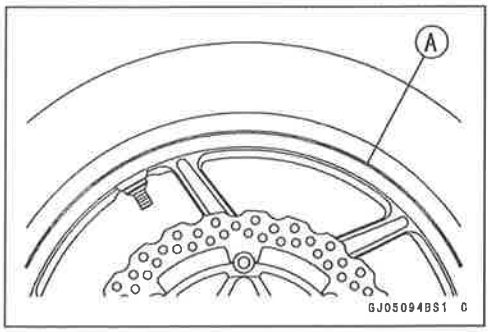
★If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.

- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.

○Inflate the tire slightly above standard inflation.

○Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.

- Adjust the air pressure to the specified pressure (see Air Pressure Inspection in the Periodic Maintenance chapter).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment).



Tire Repair

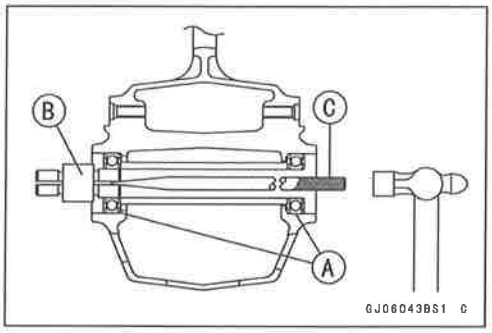
Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

Hub Bearing

Hub Bearing Removal

- Remove the wheel (see Front/Rear Wheel Removal), and take out the following.
  Collars
  Coupling (Out of rear hub)
  Grease Seals

- Use the bearing remover to remove the hub bearing [A].



NOTICE

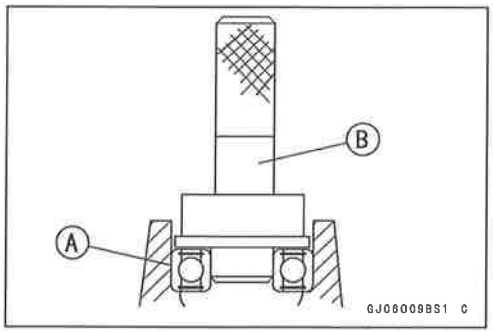
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Special Tools - Bearing Remover Head, ϕ25 × ϕ28 [B]: 57001-1346
Bearing Remover Head, ϕ20 × ϕ22: 57001-1293
Bearing Remover Shaft, ϕ13 [C]: 57001-1377

Hub Bearing Installation

- Before installing the hub bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.
- Press in each right the bearing [A] until they are bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129



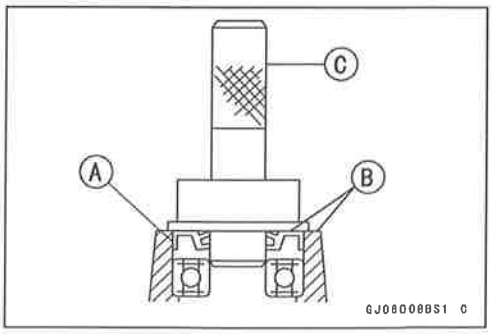
- Confirm that the axle can be inserted smoothly.
- Confirm that the each bearing inner race can be turned smoothly. Then visually inspect that the inner race of the opposite side turns.

★If they do not turn smoothly, remove the bearings and collars and visually inspect the wheel and collars.

- Replace the grease seals with new ones.
- Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.

○Apply high-temperature grease to the grease seal lips.

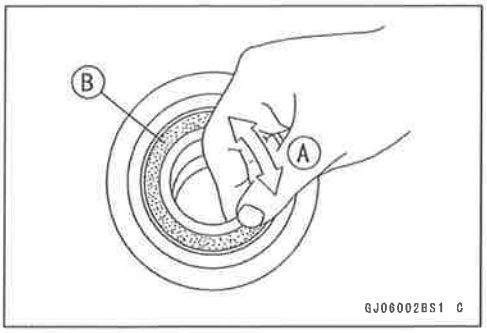
Special Tool - Bearing Driver Set [C]: 57001-1129



Hub Bearing

Hub Bearing Inspection

Since the hub bearings are made to extremely close tolerances, the clearance can not normally be measured.



NOTE

○*Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.*

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.

★If bearing play, roughness or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.

Hub Bearing Lubrication

NOTE

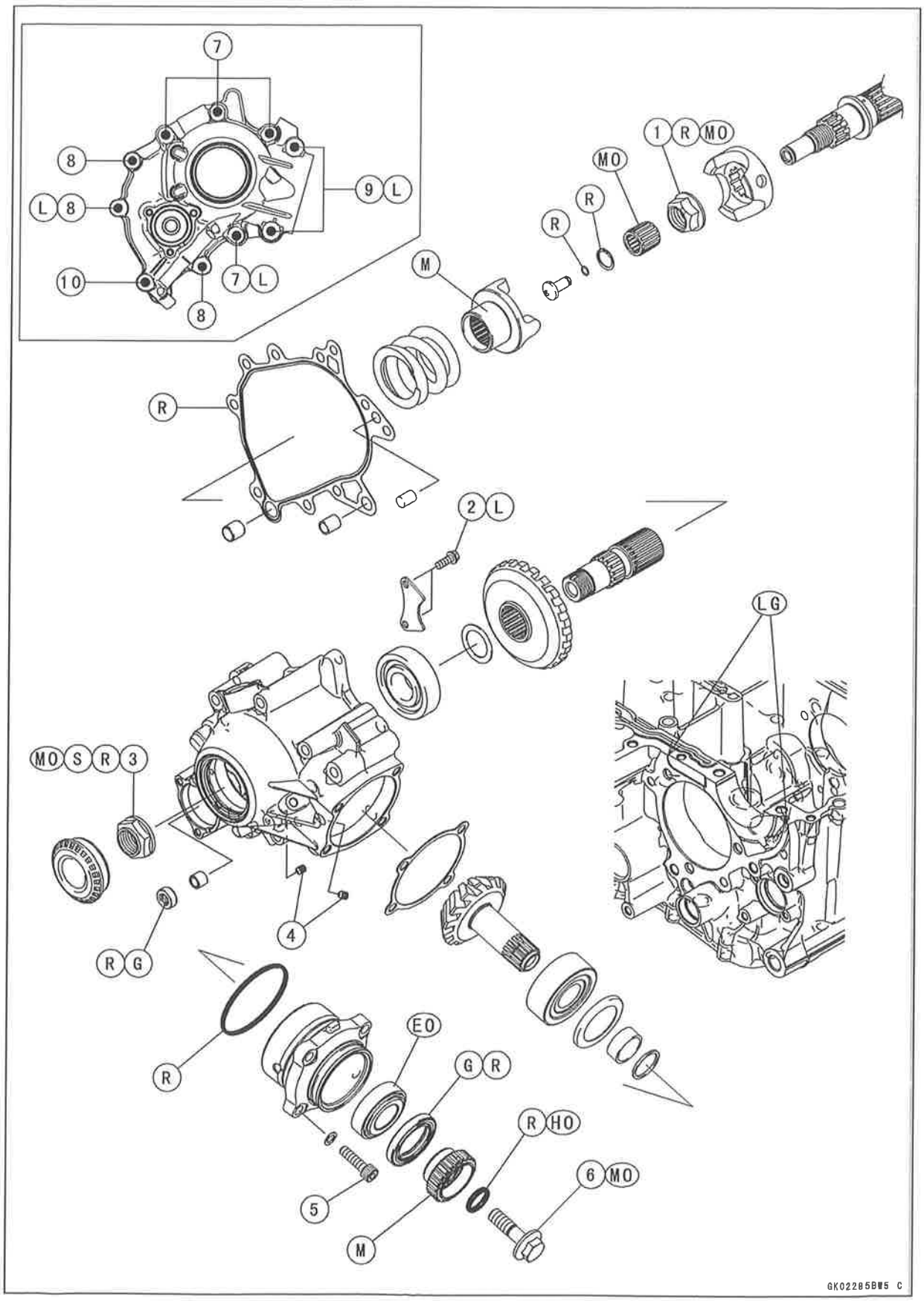
○*Since the hub bearings are packed with grease and sealed, lubrication is not required.*

Final Drive

Table of Contents

Exploded View 11-2
Specifications 11-6
Special Tools and Sealant 11-7
Final Gear Case and Oil 11-9
  Oil Level Inspection 11-9
  Oil Change 11-9
  Final Gear Case Removal 11-9
  Final Gear Case Installation 11-10
  Final Gear Case Disassembly 11-11
  Final Gear Case Assembly 11-14
  Sliding Joint Inspection 11-17
  Bevel Gear Inspection 11-17
  Final Bevel Gear Adjustment 11-17
  Backlash Adjustment 11-18
  Tooth Contact Adjustment 11-19
Propeller Shaft 11-22
  Propeller Shaft Removal 11-22
  Propeller Shaft Installation 11-23
  Propeller Shaft Inspection 11-24
  Propeller Shaft O-ring Replacement 11-25
Front Bevel Gears 11-27
  Front Gear Case Removal 11-27
  Front Gear Case Installation 11-27
  Front Gear Case Disassembly 11-28
  Front Gear Case Assembly 11-29
  Driven Gear Disassembly 11-30
  Driven Gear Assembly 11-31
  Damper Cam Removal 11-32
  Damper Cam Installation 11-32
  Front Bevel Gear Adjustment 11-32
  Preload Adjustment 11-34
  Preload Measurement with Spring Scale 11-34
  Backlash Adjustment 11-36
  Tooth Contact Adjustment 11-37
  Bevel Gear Inspection 11-38
  Cam Damper Inspection 11-39
Bearing and Oil Seal 11-40
  Ball or Needle Bearing Replacement 11-40
  Ball Bearing Wear Inspection 11-40
  Tapered Roller Bearing Inspection 11-41
  Needle Bearing Inspection 11-41
  Oil Seal Inspection 11-41

Exploded View



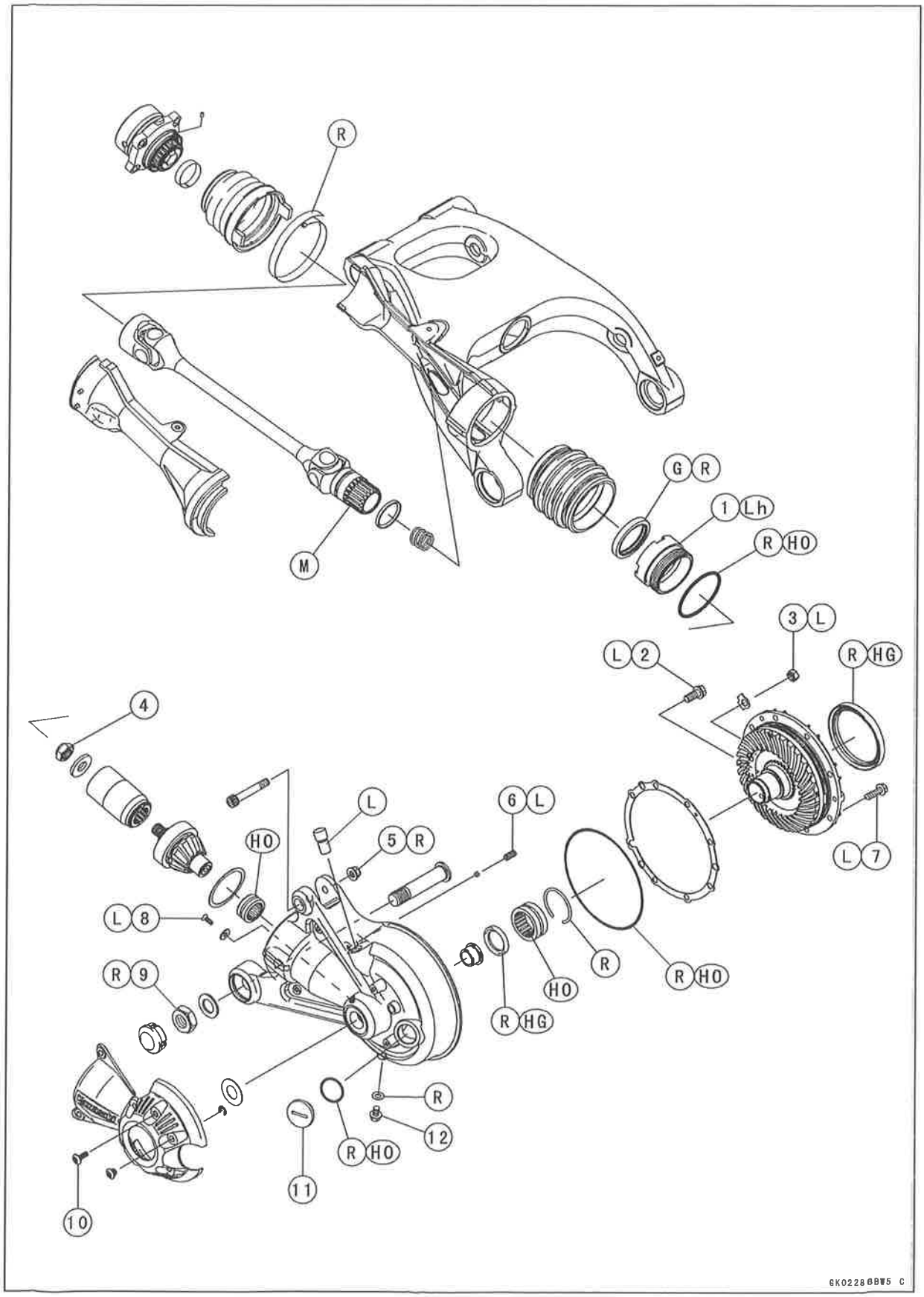
Exploded View

Front Gear Case

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Damper Cam Nut	210	21.4	155	MO, R
2	Bearing Retainer Bolts	8.8	0.90	78 in·lb	L
3	Drive Gear Nut	380	38.7	280	MO, R, S
4	Oil Nozzles	3.0	0.31	27 in·lb	
5	Driven Gear Assy Mounting Bolts	25	2.5	18	
6	Driven Gear Bolt	130	13.3	95.9	MO
7	Front Gear Case Bolts (L = 95 mm)	29	3.0	21	L (1)
8	Front Gear Case Bolts (L = 35 mm)	20	2.0	15	L (1)
9	Front Gear Case Bolts (L = 92 mm)	29	3.0	21	L
10	Front Gear Case Bolt (L = 50 mm)	20	2.0	15	

EO: Apply engine oil.
G: Apply grease.
HO: Apply hypoid gear oil.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight 10 : 1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View



Exploded View

Final Gear Case

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Bearing Retainer	540	55.1	398	Lh
2	Final Gear Case Cover Bolts (M10)	34	3.5	25	L
3	Adjuster Locknut	40	4.1	30	L
4	Pinion Gear Assembly Nut	128	13.1	94.4	
5	Torque Rod Nut	60	6.1	44	R
6	Lock Pin	16	1.6	12	L
7	Final Gear Case Cover Bolts (M8)	24	2.4	18	L
8	Bearing Retainer Bolt	7.0	0.71	62 in·lb	L
9	Final Gear Case Locknut	100	10.2	73.8	R
10	Final Gear Case Outer Cover Bolts	9.8	1.0	87 in·lb	
11	Filler Plug	6.0	0.61	53 in·lb	
12	Final Gear Case Oil Drain Bolt	17	1.7	13	

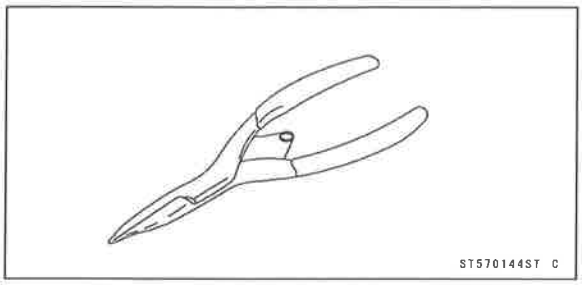
G: Apply grease.
HG: Apply high-temperature grease.
HO: Apply hypoid gear oil.
L: Apply a non-permanent locking agent.
Lh: Left-hand threads
M: Apply molybdenum disulfide grease.
R: Replacement Parts

Specifications

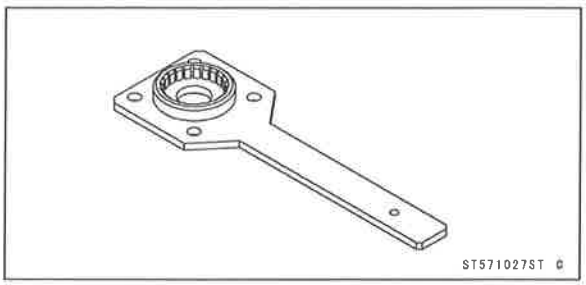
Item	Standard
Final Gear Case and Oil	
Final Gear Case Oil:	
Grade	API GL-5 hypoid gear oil
Viscosity	When above 5°C (41°F) SAE90 When below 5°C (41°F) SAE80
Oil Level	Bottom of filler opening
Amount	About 160 mL (5.41 US oz.)
Final Bevel Gear Backlash	0.10 ~ 0.20 mm (0.0039 ~ 0.0079 in.) at ring gear hub splines
Front Bevel Gears	
Preload for Pinion Gear Bearing:	
Torque Wrench	0.49 ~ 0.88 N·m (0.05 ~ 0.09 kgf·m, 4.34 ~ 7.81 in·lb)
Spring Seal	2.45 ~ 4.41 N (0.25 ~ 0.45 kgf, 0.55 ~ 0.99 lb)
Front Bevel Gear Backlash	0.10 ~ 0.20 mm (0.0039 ~ 0.0079 in.) at drive gear teeth

Special Tools and Sealant

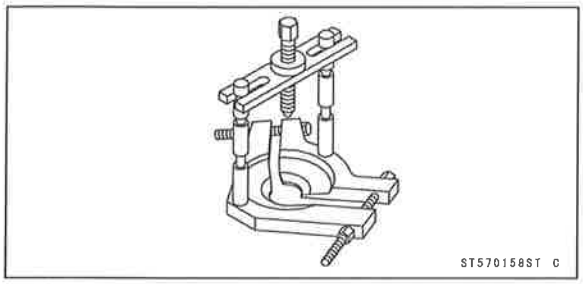
Outside Circlip Pliers:
57001-144



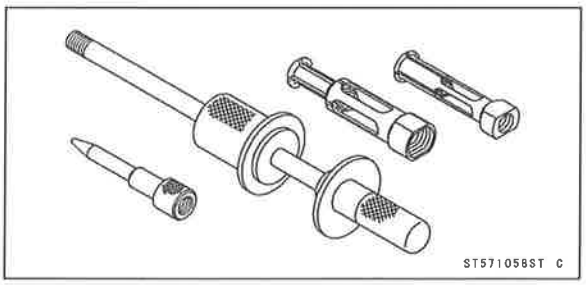
Driven Gear Holder, m2:
57001-1027



Bearing Puller:
57001-158



Oil Seal & Bearing Remover:
57001-1058



Bearing Puller Adapter:
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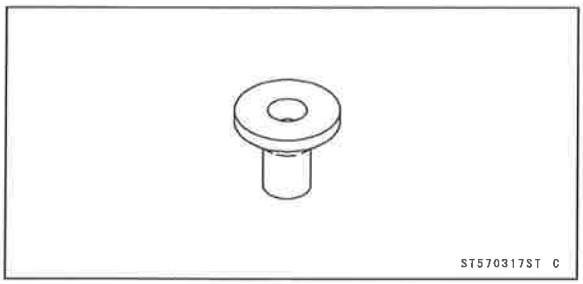
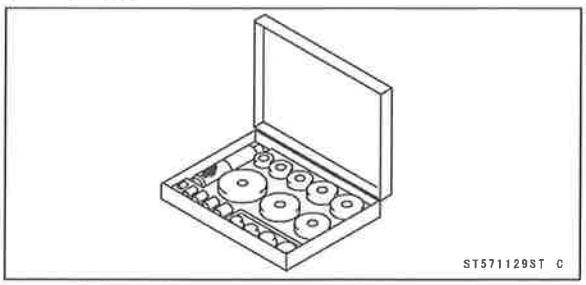
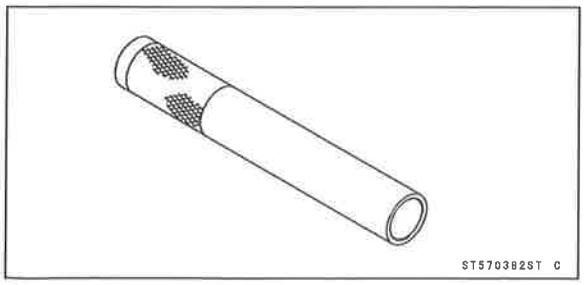


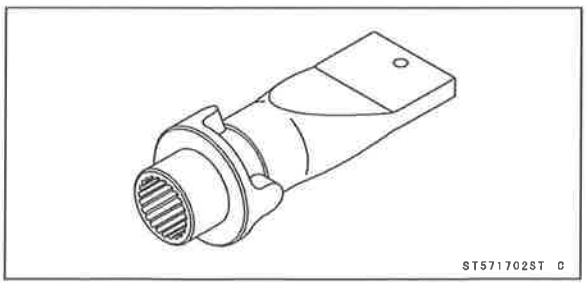
Bearing Driver Set:
57001-1129



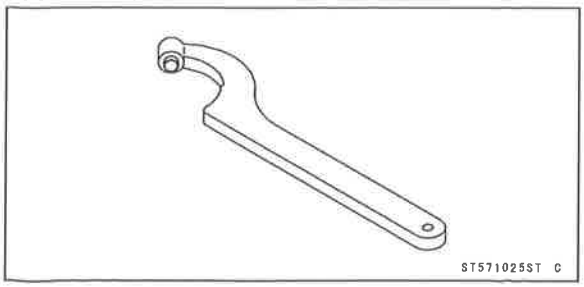
Bearing Driver, ϕ32:
57001-382



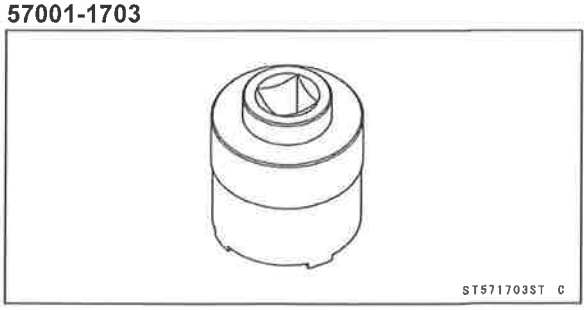
Drive Shaft Holder, m1.25:
57001-1702



Damper Cam Holder:
57001-1025

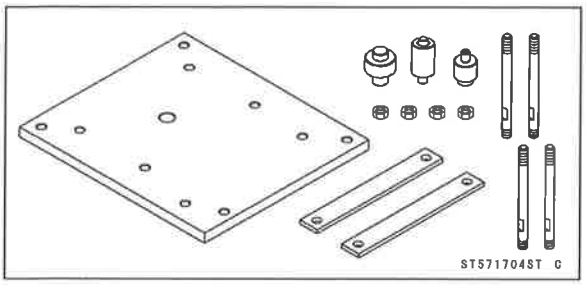


Retainer Wrench:
57001-1703

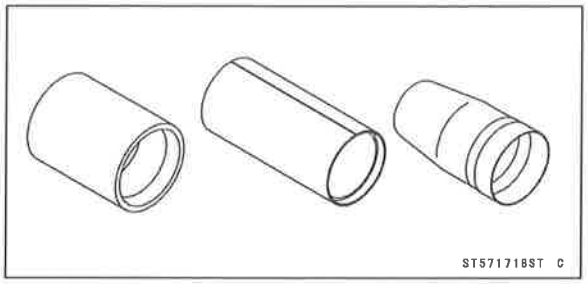


Special Tools and Sealant

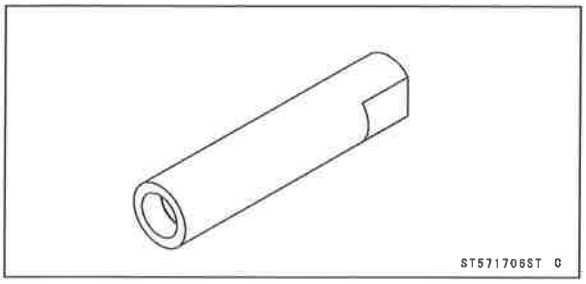
Base Set:
57001-1704



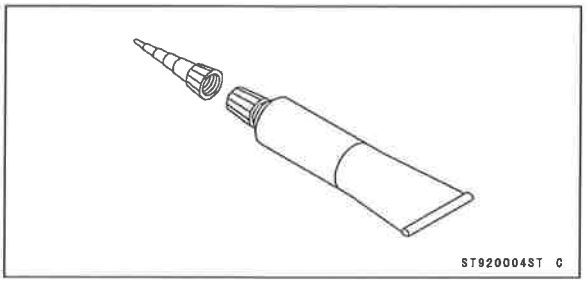
O-ring Installer:
57001-1718



Bevel Gear Holder:
57001-1706



Liquid Gasket, TB1211F:
92104-0004



Final Gear Case and Oil

Oil Level Inspection

- Refer to the Final Gear Case Oil Level Inspection in the Periodic Maintenance chapter.

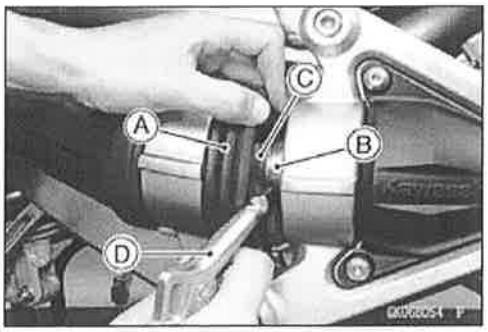
Oil Change

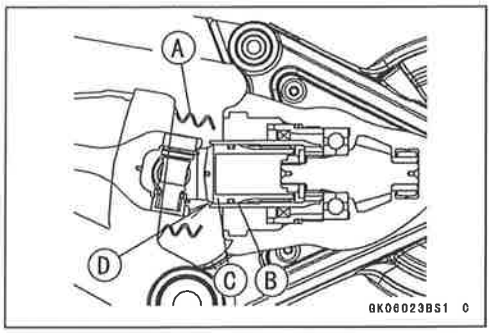
- Refer to the Final Gear Case Oil Change in the Periodic Maintenance chapter.

Final Gear Case Removal

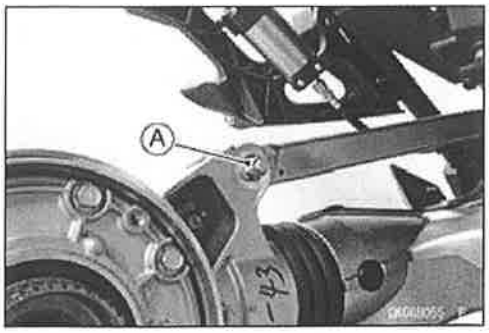
★If the final gear case is to be disassembled, drain the final gear case oil.

- Remove:
  Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
- Slide the rubber boot [A].
- Blow away dirt or dust between the joint [B] and yoke [C] by applying compressed air [D].

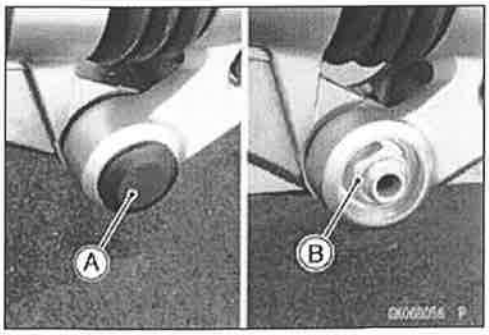




- Remove:
  Torque Rod Nut [A]

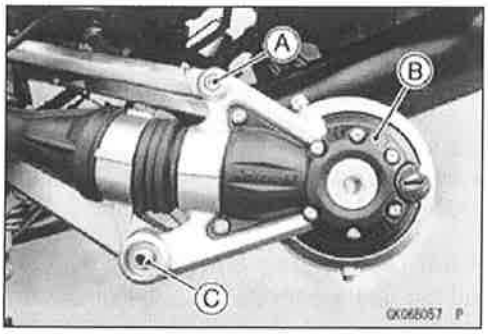


- Remove:
  Cap [A]
  Final Gear Case Locknut [B]



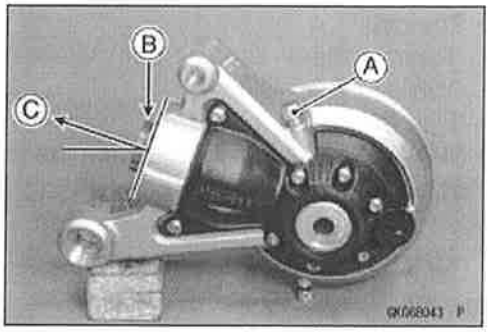
Final Gear Case and Oil

- Remove the torque rod bolt [A] (upper side).
- Remove the final gear case [B] by taking off the final gear case bolt [C] (lower side).



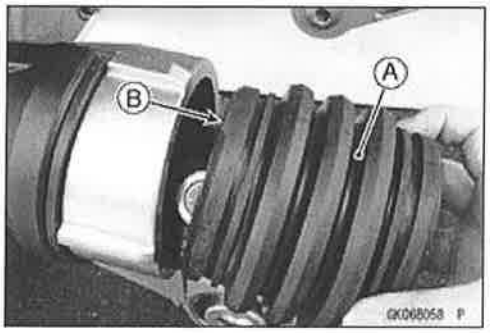
NOTE

○*If the final gear case is full of oil, place the case so that the breather [A] is on top, and joint portion [B] of the case is upward [C] for prevent the oil leak.*

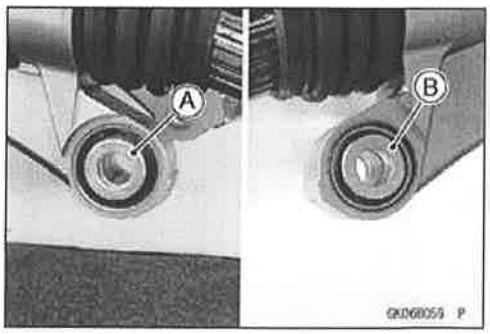


Final Gear Case Installation

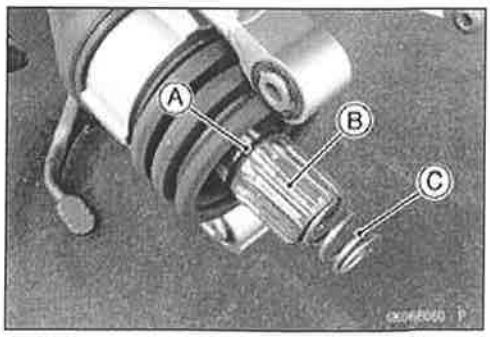
- When installing the rubber boot [A], install it so that the projection [B] faces upward.



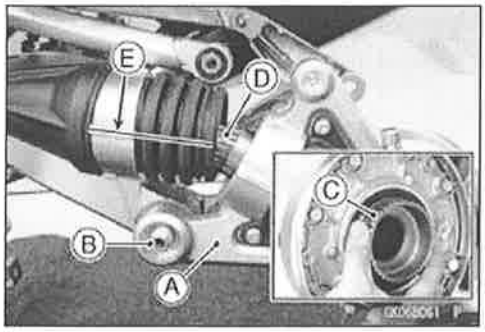
- Fit the collars on the both side of the swingarm.
  Left Side Collar [A]
  Right Side Collar [B]



- Apply molybdenum disulfide grease to the rareflon ring [A] and propeller shaft splines portion [B].
- Install the spring [C] in the joint.



Final Gear Case and Oil



- Fit the lower joint portion [A] of the final gear case onto the swingarm.
- Insert the final gear case bolt [B].
- Fit the pinion gear joint splines onto the propeller shaft splines while turning the ring gear hub [C].

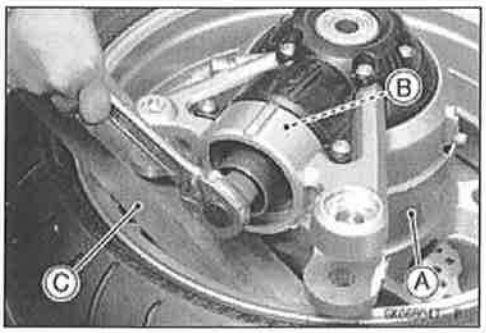
○Align the shaft end [D] parallel the center line [E] of the swingarm.

- Install the torque rod and torque rod bolt.
- Replace the final gear case locknut and torque rod nut with new ones.
- Tighten:

Torque - Final Gear Case Locknut: 100 N·m (10.2 kgf·m, 73.8 ft·lb)
Torque Rod Nut: 60 N·m (6.1 kgf·m, 44 ft·lb)

★If the final gear case oil was drained, fill the case with oil (see Final Gear Case Oil Change in the Periodic Maintenance chapter).

Final Gear Case Disassembly

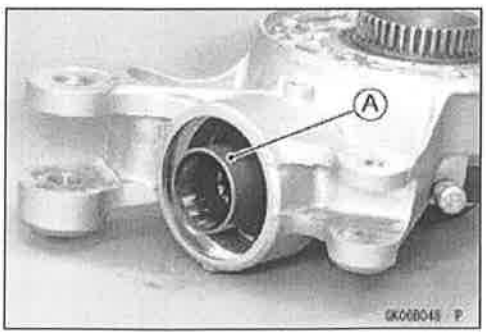


- Drain the oil (see Final Gear Case Oil Change in the Periodic Maintenance chapter).
- Remove the final gear case (see Final Gear Case Removal).
- Using the hub assembly [A], remove the pinion gear assembly nut [B].

○Insert the wooden bar [C] between the spokes.

NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc dose not touch the ground.

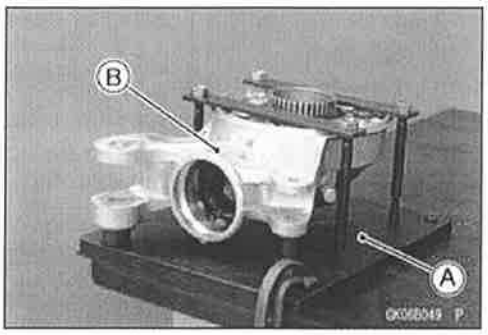


- Remove:
  Sliding Joint [A] and Washer

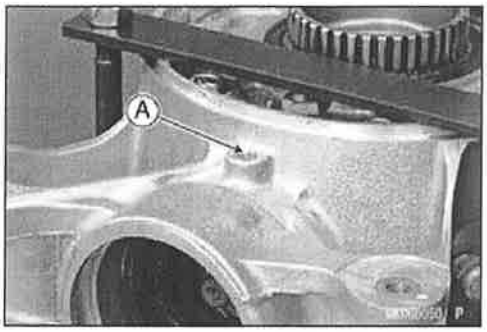
Final Gear Case and Oil

- Using the base set [A] hold the final gear case [B].

Special Tool - Base Set: 57001-1704



- Loosen the lock pin [A].

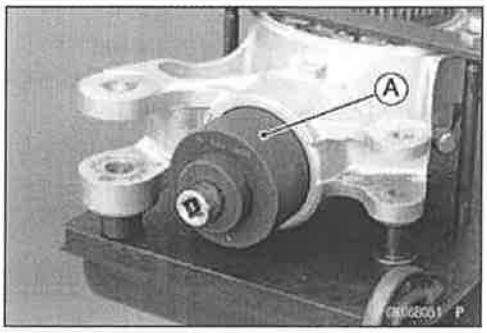


- Using retainer wrench [A] remove the bearing retainer.

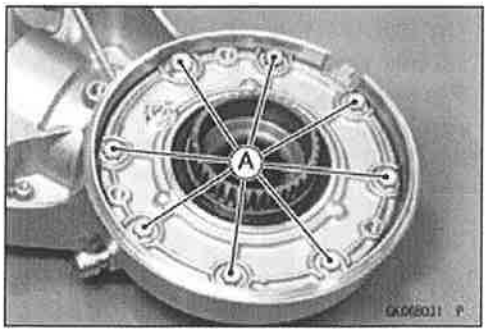
○The bearing retainer is left-hand threads.

Special Tool - Retainer Wrench: 57001-1703

- Remove:
  Pinion Gear Assembly and Shim(s)
  Lock Pin and Plug



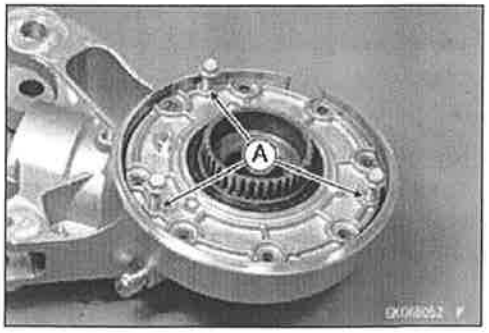
- Remove:
  Final Gear Case Cover Bolts [A]



- Use three tapped holes [A] to lift the ring gear assembly from the gear case. The shim(s) comes off with the assembly.

NOTE

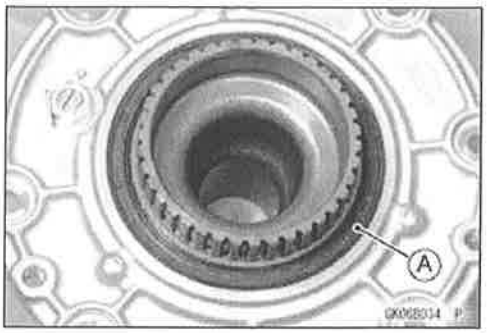
○*Do not disassemble the ring gear assembly (ring gear, ring gear hub, and final gear case cover), but the oil seal can be removed.*



Final Gear Case and Oil

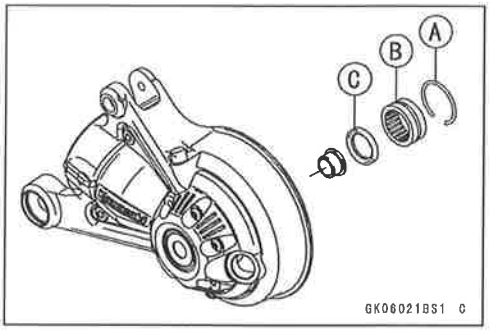
- To remove the ring gear oil seal [A], heat the ring gear assembly in an oil bath to **120 ~ 150°C (248 ~ 302°F)**, then pry out the oil seal with an awl or other tool. Be careful not to scratch the sealing surface on the ring gear hub.

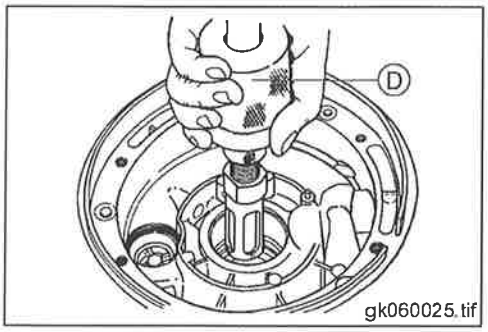
NOTICE
Do not heat the case with a blowtorch. This will warp the case.



- Remove the snap ring [A] and pull out the needle bearing [B].
- ★If the small ring gear oil seal [C] is damaged, remove it using the oil seal and bearing remover.

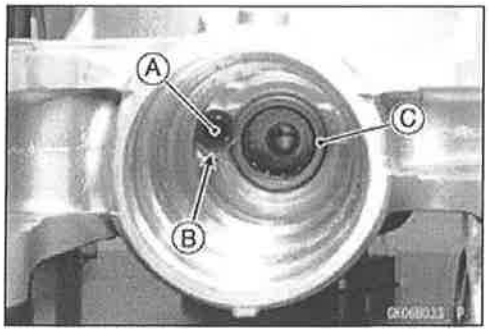
Special Tool - Oil Seal & Bearing Remover [D]: 57001-1058





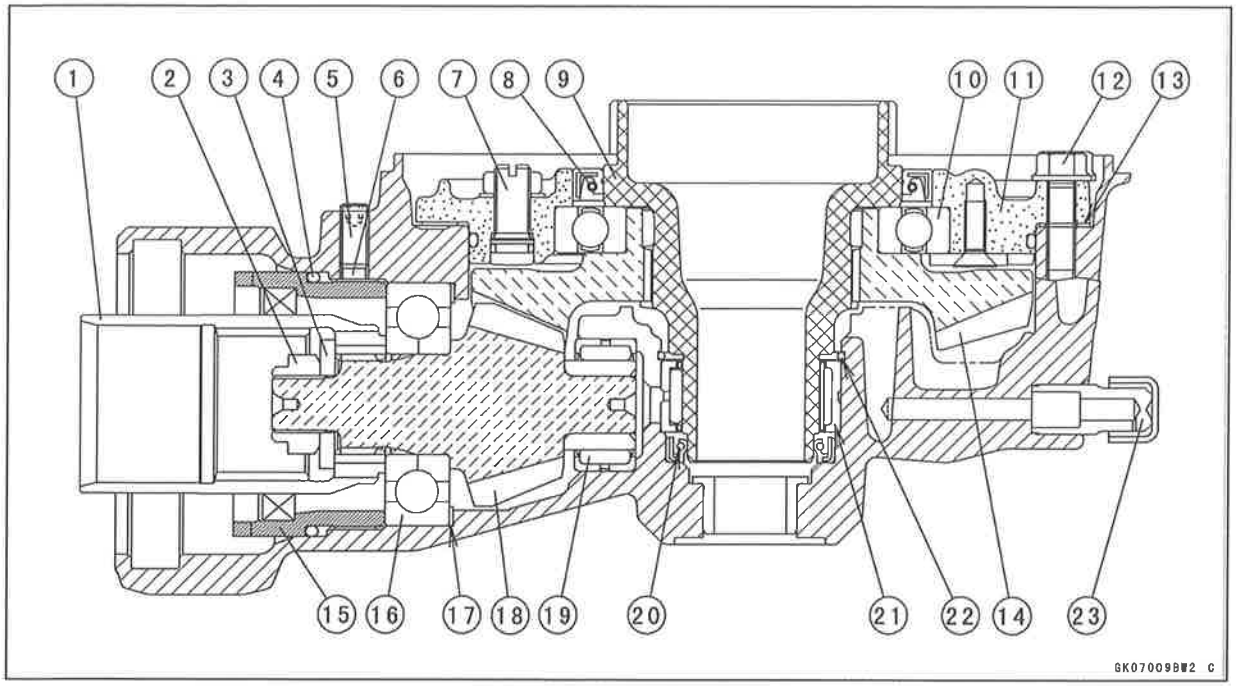
- Remove the bearing retainer screw [A] and washer [B].
- Pull out the needle bearing [C].

Special Tool - Oil Seal & Bearing Remover: 57001-1058



Final Gear Case and Oil

Final Gear Case



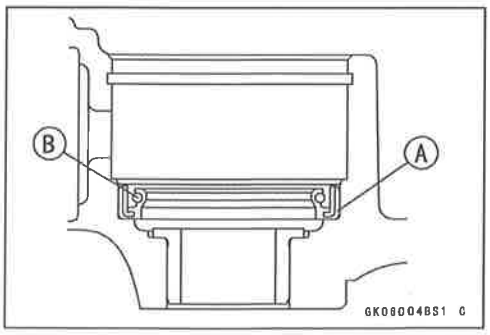
1. Sliding Joint
2. Pinion Gear Assembly Nut
3. Washer
4. O-ring
5. Lock Pin
6. Plug
7. Adjuster
8. Ring Gear Oil Seal
9. Ring Gear Hub
10. Ball Bearing
11. Final Gear Case Cover
12. Final Gear Case Cover Bolts
13. Ring Gear Shim(s)
14. Ring Gear
15. Bearing Retainer
16. Ball Bearing
17. Pinion Gear Shim(s)
18. Pinion Gear
19. Roller Bearing
20. Small Ring Gear Oil Seal
21. Needle Bearing
22. Snap Ring
23. Breather Fitting

Final Gear Case Assembly

○The ring gear and pinion gear are lapped as a set in the factory to get the best tooth contact. They must be installed as a pair, and never replace one without the other.

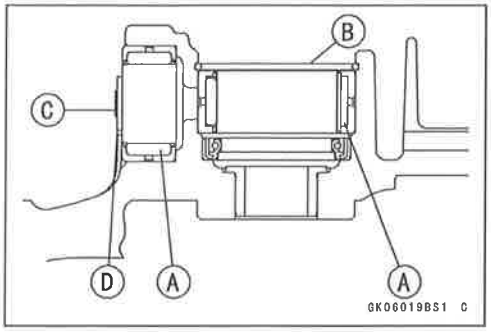
- Press the small ring gear oil seal [A] until it bottoms out with its spring [B] facing inward.
- Apply a thin coat of high temperature grease to the oil seal lip.

Special Tool - Bearing Driver Set: 57001-1129



Final Gear Case and Oil

- Replace the needle bearings [A] with new ones.
- Apply a hypoid gear oil to the roller parts of the needle bearings.



NOTE

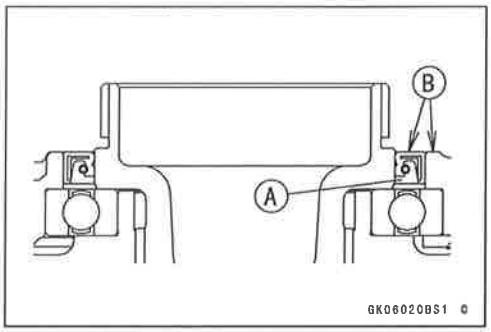
○Install the bearing so that the marked side faces out.
○Press in the bearings until they are bottomed.

Special Tool - Bearing Driver Set: 57001-1129

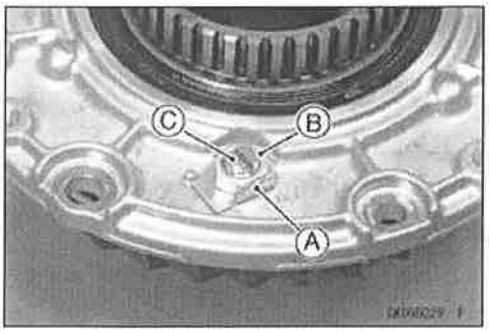
- Install a new snap ring [B] secure.
- Apply a non-permanent locking agent to the threads of the bearing retainer bolt [C].
- Install the washer [D] and the bearing retainer bolt.
- Tighten:

Torque - Bearing Retainer Bolt: 7.0 N·m (0.71 kgf·m, 62 in·lb)

- Apply a thin coat of high temperature grease to the oil seal lip of the ring gear oil seal.
- Install the ring gear oil seal with its spring [A] facing inward using a suitable driver until the face of the seal is even [B] with the end of the hole.



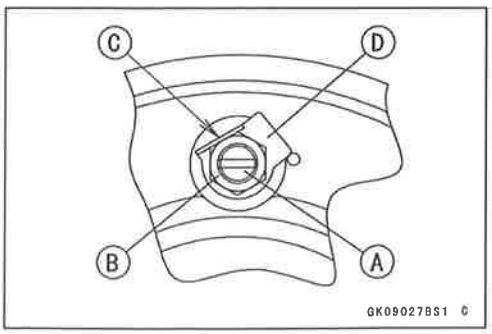
- Bend the lock washer [A] straight.
- Remove the locknut [B] and loosen adjuster [C].



- Turn the adjuster [A] clockwise until it becomes hard to turn, and then back it out 1/4 ~ 1/2 turn.
- Apply a non-permanent locking agent to the threads of the adjuster locknut [B].
- Tighten:

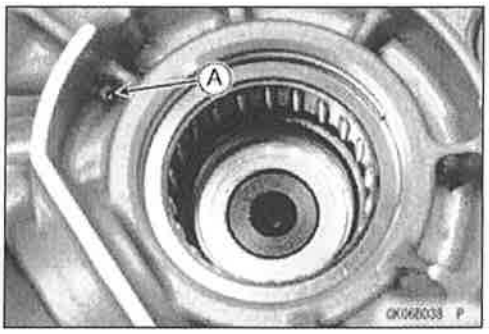
Torque - Adjuster Locknut: 40 N·m (4.1 kgf·m, 30 ft·lb)

- Bend [C] the lock washer [D].



Final Gear Case and Oil

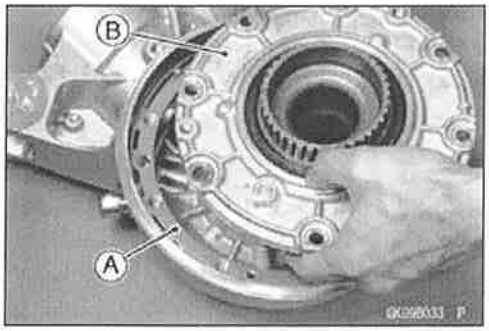
- Blow the breather hole [A] in the final gear case clean with compressed air.



- Replace the O-ring with a new one, and apply a hypoid gear oil to it.
- Install the shim(s) [A] and ring gear assembly [B].

OReinstall the original ring gear shim(s) to keep the gear backlash and the tooth contact unchanged.

OWhen final gear case parts are replaced, the final bevel gear must be adjusted (see Final Gear Backlash and Tooth Contact Adjustment).



- Apply a non-permanent locking agent to the threads of the final gear case cover bolts.
- Tighten:

Torque - Final Gear Case Cover Bolts:
M10: 34 N·m (3.5 kgf·m, 25 ft·lb)
M8: 24 N·m (2.4 kgf·m, 18 ft·lb)

- Replace the O-ring with a new one, and apply a hypoid gear oil to it.
- Insert the shim(s) and pinion gear assembly [A].

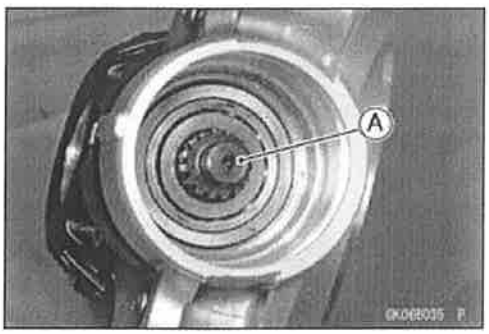
OReinstall the pinion gear assembly shim(s) to keep the gear backlash and the tooth contact unchanged.

- Tighten the bearing retainer.

OThe bearing retainer is left-hand threads.

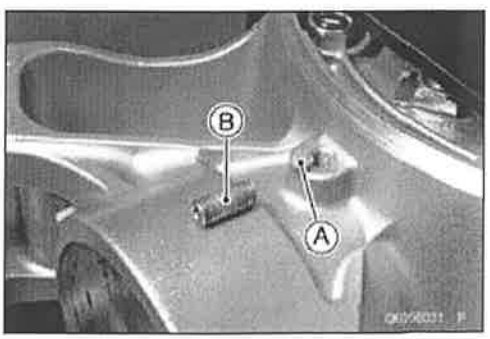
Special Tools - Retainer Wrench: 57001-1703
Base Set: 57001-1704

Torque - Bearing Retainer: 540 N·m (55.1 kgf·m, 398 ft·lb)



- Apply a non-permanent locking agent to the threads of the lock pin.
- Install the plug [A] and lock pin [B].

Torque - Lock Pin: 16 N·m (1.6 kgf·m, 12 ft·lb)



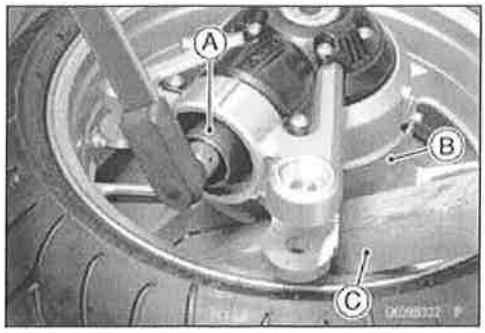
Final Gear Case and Oil

- Install the sliding joint [A] and washer.
- Using the hub assembly [B], tighten the pinion gear assembly nut.

○Insert the wooden bar [C] between the sporks.

Torque - Pinion Gear Assembly Nut: 128 N·m (13.1 kgf·m, 94.4 ft·lb)

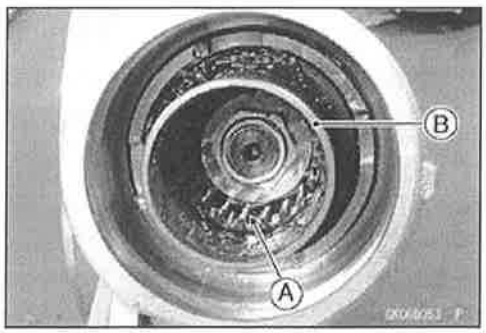
- Install the final gear case (see Final Gear Case Installation).



Sliding Joint Inspection

- Remove:
  Final Gear Case (see Final Gear Case Removal)
- Visually inspect the internal splines [A] of the propeller shaft sliding joint [B].

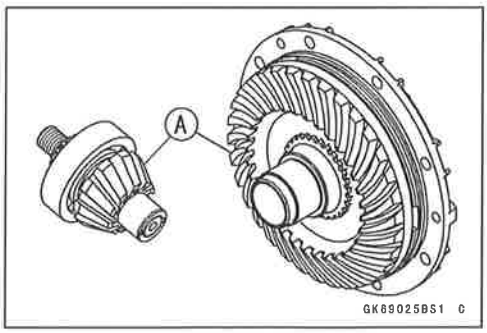
★If they are badly worn or chipped, replace the joint with a new one.



Bevel Gear Inspection

- Visually check the bevel gears [A] for scoring, chipping, or other damage.

★Replace the bevel gears as a set if either gear is damaged.



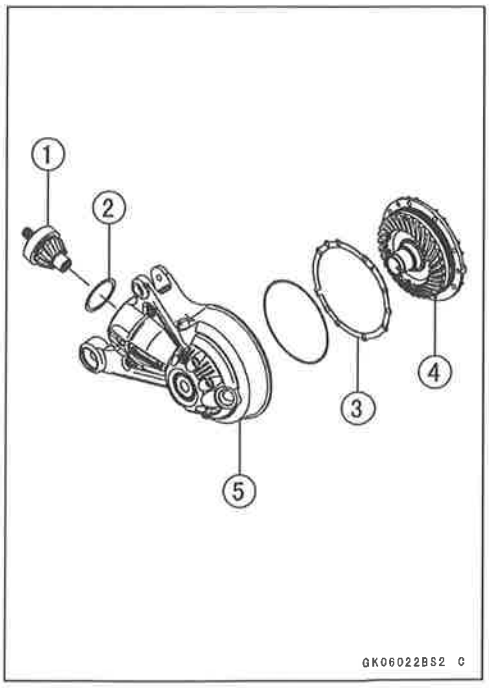
Final Bevel Gear Adjustment

○The **backlash** and **tooth contact pattern** of the bevel gears must be correct to prevent the gears from making noise and being damaged.

- After replacing any of the backlash-related parts, be sure to check and adjust the backlash and tooth contact of the bevel gears. First, adjust backlash, and then tooth contact by replacing shims.
  1. Pinion Gear Assembly
  2. Pinion Gear Shim(s)
  3. Ring Gear Shim(s)
  4. Ring Gear Assembly
  5. Final Gear Case

○The amount of backlash is influenced by the ring gear position more than by the pinion gear position.

○Tooth contact locations is influenced by pinion gear position more than by ring gear position.



Final Gear Case and Oil

Ring Gear Shims for Backlash Adjustment

Thickness (mm)	Parts Number
0.15 (0.0059 in.)	92180-0263
0.5 (0.020 in.)	92180-0264
0.6 (0.024 in.)	92180-0265
0.7 (0.028 in.)	92180-0266
0.8 (0.031 in.)	92180-0267
0.9 (0.035 in.)	92180-0268
1.0 (0.039 in.)	92180-0269
1.2 (0.047 in.)	92180-0270

Pinion Gear Shims for Tooth Contact Adjustment

Thickness (mm)	Parts Number
0.10 (0.0039 in.)	92025-1733
0.15 (0.0059 in.)	92025-1734
0.5 (0.020 in.)	92025-1735
0.6 (0.024 in.)	92025-1736
0.7 (0.028 in.)	92025-1737
0.8 (0.031 in.)	92025-1738
0.9 (0.035 in.)	92025-1739
1.0 (0.039 in.)	92025-1740
1.2 (0.047 in.)	92025-1741

Backlash Adjustment

- Clean any dirt and oil off the bevel gear teeth with a high flash-point solvent.

NOTICE
Do not install the O-ring or oil seals during adjustment.

- Install the ring gear assembly with the primary shim (**1.0 mm, (0.039 in.), thickness**), and tighten the cover bolts to the specified torque.

Torque - Final Gear Case Cover Bolts:
M10: 34 N·m (3.5 kgf·m, 25 ft·lb)
M8: 24 N·m (2.4 kgf·m, 18 ft·lb)

- Install the pinion gear assembly with the primary shim (**1.0 mm, (0.039 in.), thickness**).
- Hold the final gear case with the base set and tighten the bearing retainer to the specified torque.

○The bearing retainer is left-hand threads.

Special Tools - Base Set: 57001-1704
Retainer Wrench: 57001-1703

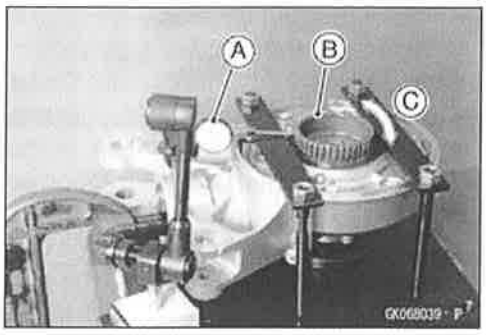
Torque - Bearing Retainer: 540 N·m (55.1 kgf·m, 398 ft·lb)

- Hold the pinion gear assembly with the bevel gear holder.

Special Tool - Bevel Gear Holder: 57001-1706

○Check the backlash during tightening of the final gear case cover bolts, and stop tightening them immediately if the backlash disappears. Then, change the ring gear shim to a thicker one.

Final Gear Case and Oil



- Mount a dial gage [A] on the base so that the tip of the gage is against the splines of the ring gear hub.
- To measure the backlash, turn the ring gear hub [B] back and forth [C]. The difference between the highest and the lowest gage reading is the amount of backlash.

○Measure backlash at three locations equally spaced on the splines.

Final Bevel Gear Backlash:

0.10 ~ 0.20 mm (0.0039 ~ 0.0079 in.) (at ring gear hub splines)

★If the backlash is out of the limit, replace the ring gear shim(s). To increase backlash, increase the thickness of the shim(s). To decrease backlash, decrease the thickness of the shim(s).

- Change the thickness a little at a time.
- Recheck the backlash, and readjust as necessary.

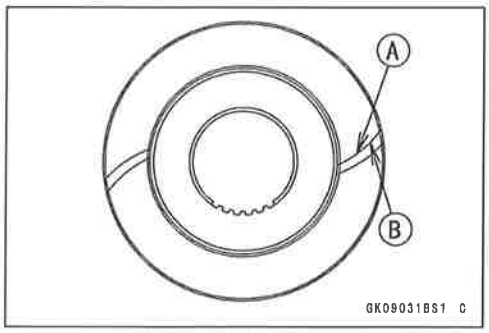
NOTE

○*It is OK to pack two shims. Do not pack three or more shims.*

Tooth Contact Adjustment

- Clean any dirt and oil off the bevel gear teeth with a high flash-point solvent.
- Apply checking compound to 4 or 5 teeth of the pinion gear.

Concave Side Tooth [A]
Convex Side Tooth [B]



NOTE

○*Apply checking compound to the teeth in a thin, even coat with a fairly stiff paint brush. If painted too thickly, the exact tooth pattern may not appear.*

○*The checking compound must be smooth and firm, with the consistency of tooth paste.*

○*Special compounds are available at automotive supply stores for the purpose of checking differential gear tooth patterns and contact.*

- Install the pinion gear assembly to the final gear case.
- Tighten:

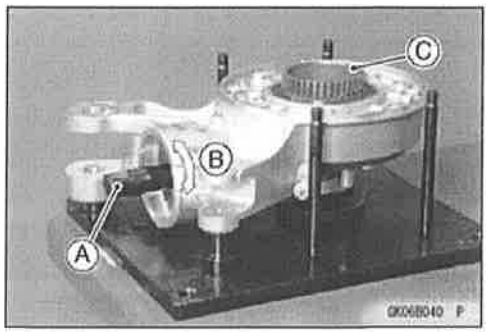
○The bearing retainer is left-hand threads.

Torque - Bearing Retainer: 540 N·m (55.1 kgf·m, 398 ft·lb)

- Install the bevel gear holder [A] to the pinion gear.

Special Tool - Bevel Gear Holder: 57001-1706

- Turn the bevel gear holder for one revolution [B] back and forth, while creating a drag on the ring gear hub [C].



Final Gear Case and Oil

- Remove the ring gear assembly and pinion gear assembly to check the convex side pattern and concave side pattern of the bevel gear teeth. Good contact is achieved when the center line of the tooth contact pattern is visible in the inside of the lines shown in the figure below.

★If the tooth contact pattern is incorrect, replace the pinion gear shim(s). Then erase the tooth contact patterns, and check them again. Also check the backlash every time the shim(s) are replaced. Repeat the shim change procedure as necessary.

NOTE

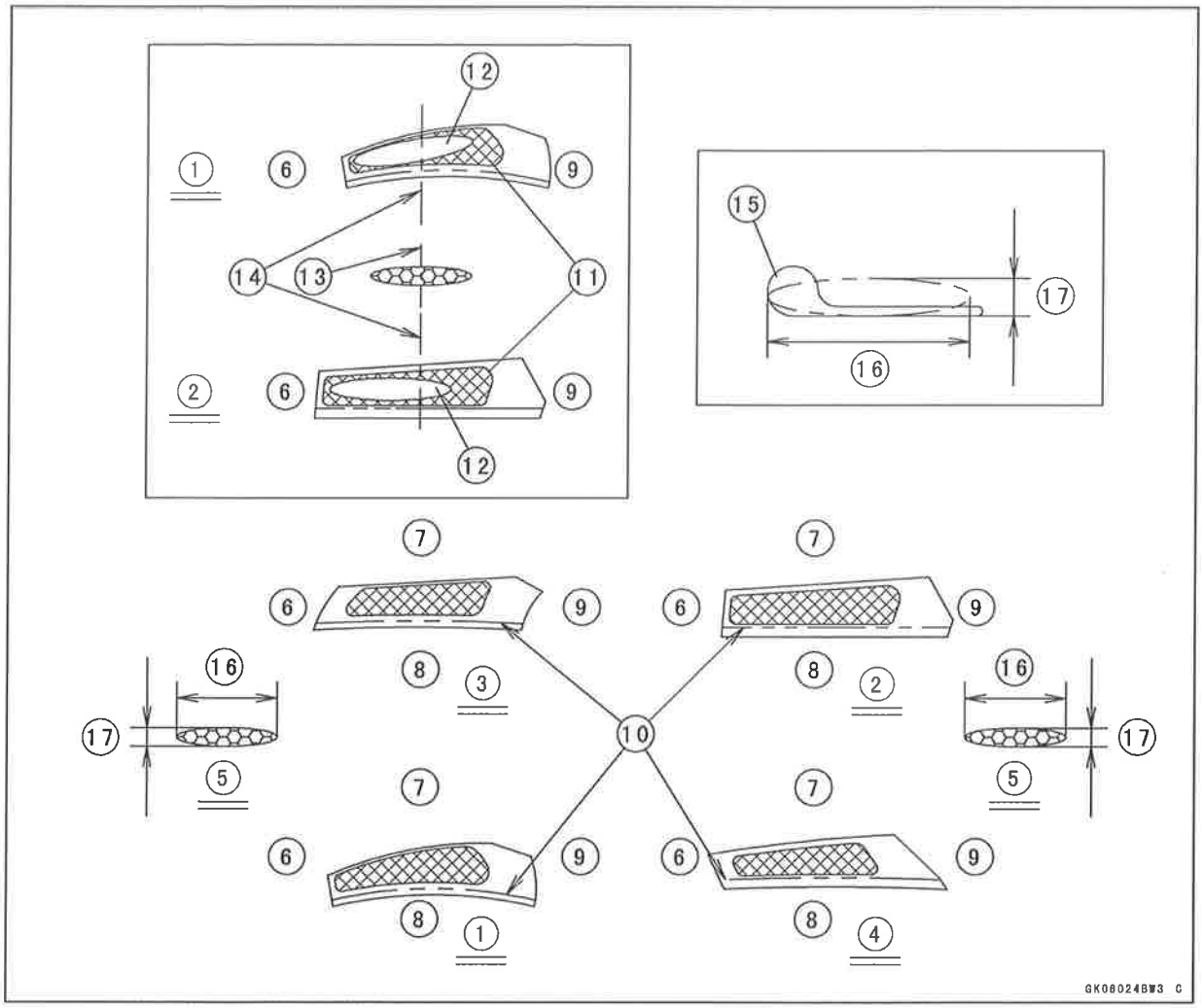
○*If the backlash is out of the standard range after changing the pinion gear shim(s), replace the ring gear shim(s) to correct the backlash before checking the tooth contact pattern.*

○*It is OK to pack two shims. Do not pack three or more shims.*

- After checking the tooth contact pattern, check the pinion gear turns freely.

Final Gear Case and Oil

Correct Tooth Contact Pattern: No adjustment is required.

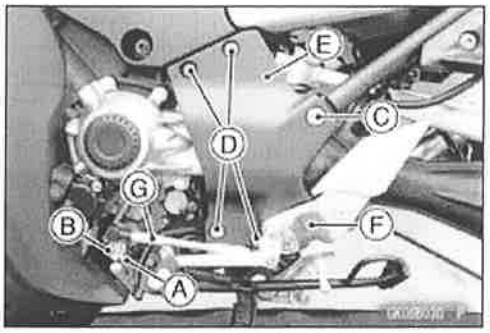


1. Concave Side of Pinion Gear
2. Convex Side of Ring Gear
3. Convex Side of Pinion Gear
4. Concave Side of Ring Gear
5. Limit of Good Contact Pattern
6. Inside
7. Top
8. Bottom
9. Outside
10. Top of Engagement Tooth
11. Area of Good Contact Pattern
12. Aiming Position of Tooth Contact
13. Center Line of Tooth Contact Pattern
14. The center line of tooth contact pattern must come to inside of the line shown in the figure.
15. The extreme pattern like figure is improper.
16. 16 mm (0.63 in.)
17. 3 mm (0.12 in.)

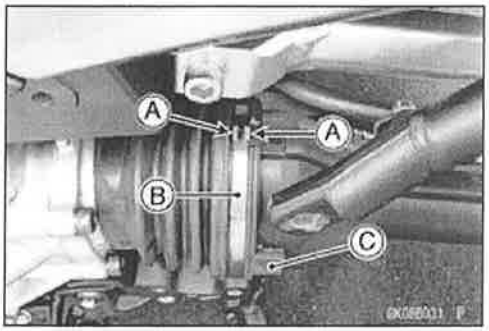
Propeller Shaft

Propeller Shaft Removal

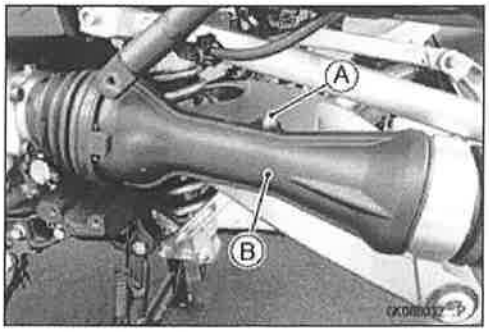
- Remove:
  Final Gear Case (see Final Gear Case Removal)
  Shift Lever Bolt [A]
  Shift Lever [B]
  Rear Frame Bolt [C] and Washer
  Frame Side Bracket Bolts [D]
- Remove the frame side bracket [E] with the footpeg [F] and tie-rod [G].



- Open the clamp portion [A] and remove the band [B].
- Pull out the rear side of the rubber boot [C] from the swingarm.

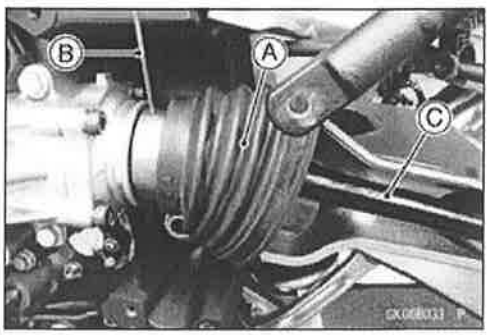


- Remove:
  Bolt [A]
- Pull out the swingarm cover [B] from the swingarm.



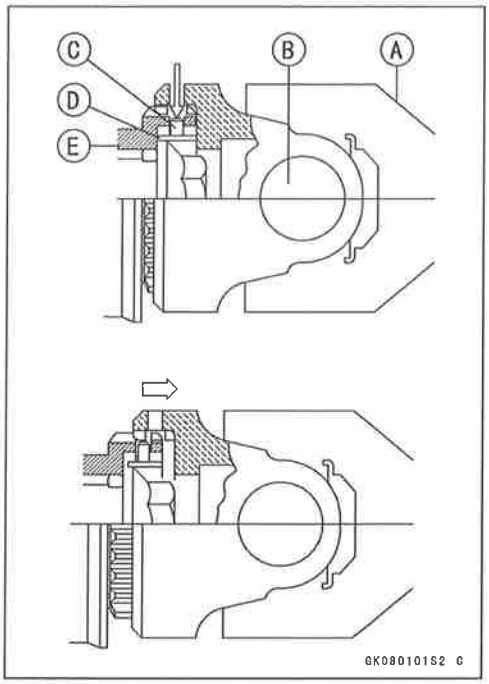
- Slide the rubber boot [A].
- Remove the propeller shaft from the front driven gear joint using the thin pushing tool [B].

○Turn the propeller shaft so that the lockpin access hole in the propeller shaft [C] comes outside.



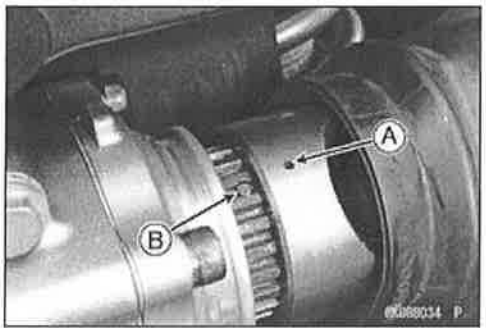
Propeller Shaft

○Move back the propeller shaft and slip the propeller shaft off the driven gear joint while pushing on the lockpin.
Propeller Shaft [A]
Universal Joint [B]
Lockpin [C]
Leaf Spring [D]
Driven Gear Joint [E]



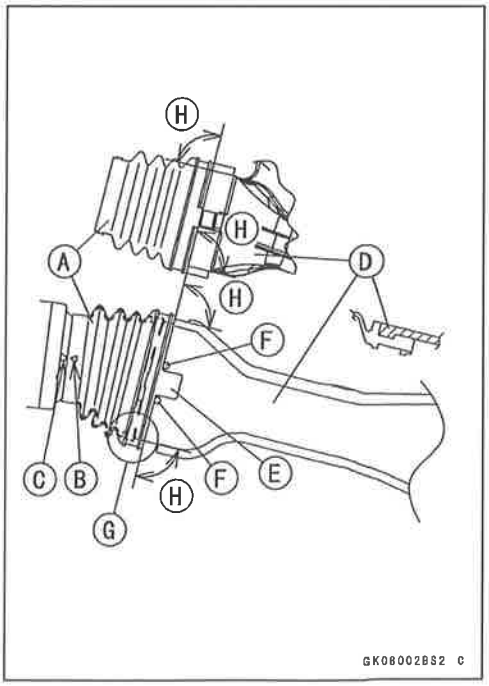
Propeller Shaft Installation

- Replace the O-ring on the rear end of the propeller shaft (see Propeller Shaft O-ring Replacement).
- Apply molybdenum disulfide grease to the driven gear joint and the rear end of the propeller shaft.
- Fit the hole [A] of the propeller shaft on the pin [B] of the driven gear joint.
- After connecting the propeller shaft to the driven gear joint, pull the propeller shaft rearward to check that the shaft is secured in place by the lockpin.



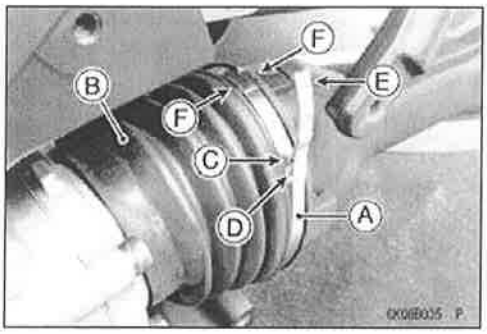
- Install the rubber boot [A] so that the mark [B] of the rubber boot align with the mark [C] of the housing.
- Install:
Swingarm Cover [D]

○Fit the tab [E] of the rubber boot between the projections [F] on the swingarm cover.
○The rubber boot must not hang over the projections.
○The rubber boot must not install deeply on the swingarm and swingarm cover [G].
○Do not install the rubber boot aslant.
90° [H]

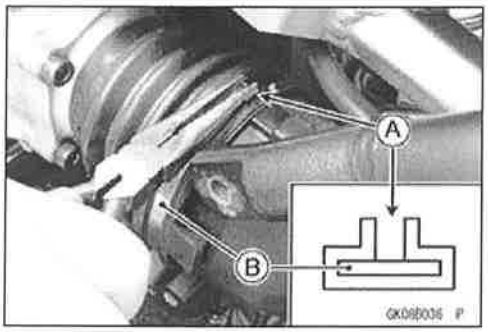


Propeller Shaft

- Install the band [A] on the rubber boot [B].
- Hook the lower end [C] to the stopper [D] and push in the upper end [E] in the clamp portion [F].

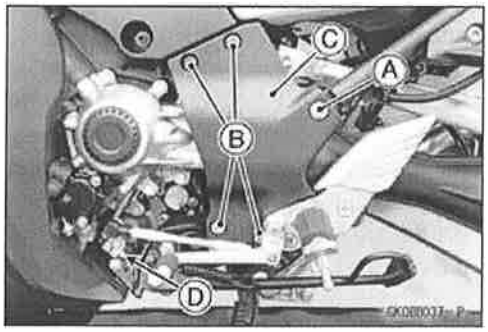


- Pinch the clamp portion [A] of the band [B].



- Apply a non-permanent locking agent to the rear frame bolt [A] and frame side bracket bolts [B].
- Install:
  Frame Side Bracket Assembly [C]
  Rear Frame Bolt and Washer
  Frame Side Bracket Bolts
- Tighten:

Torque - Rear Frame Bolt: 45 N·m (4.6 kgf·m, 33 ft·lb)
Frame Side Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



- Install:
  Shift Lever Bolt [D] (see Shift Pedal Installation in the Crankshaft/Transmission chapter)

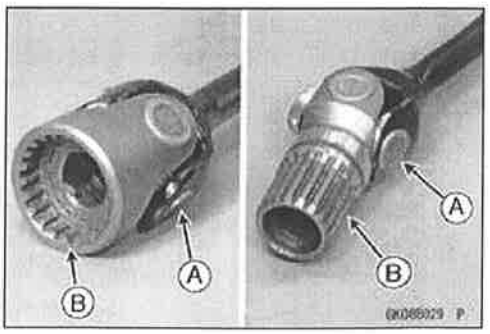
Propeller Shaft Inspection

- Check that the universal joints [A] works smoothly without rattling or sticking.

★If it does not work smoothly, the needle bearings of the universal joint are damaged. Replace the propeller shaft assy with a new one.

- Visually inspect the bending of the shaft and the wear of the splines [B] at the ends of the shaft.

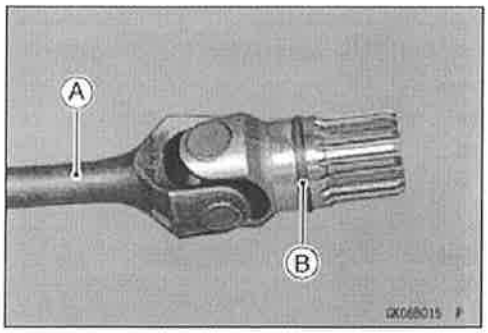
★If it is bent at all, replace the propeller shaft assy. Do not attempt to straighten a bent shaft.



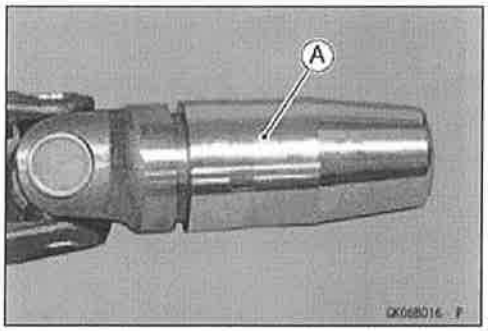
Propeller Shaft

Propeller Shaft O-ring Replacement

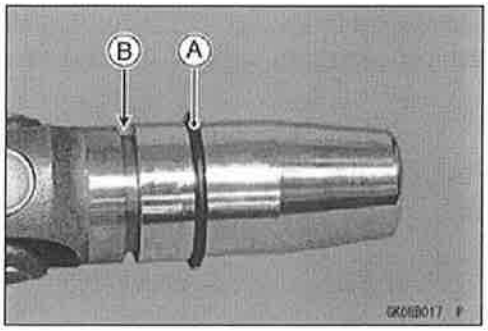
- Remove:
  Propeller Shaft [A] (see Propeller Shaft Removal)
  Rareflon Ring with O-ring [B]
- Replace the rareflon ring and O-ring with new ones.
- Apply molybdenum disulfide grease to the new O-ring.



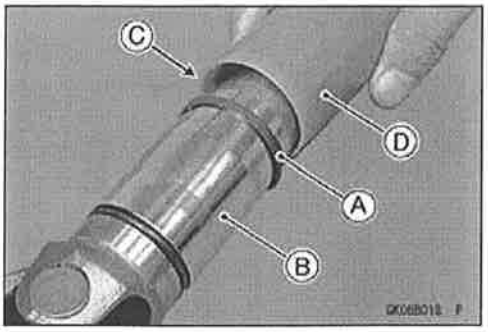
- Insert the sliding jig [A] onto the spline.
  Special Tool - O-ring Installer: 57001-1718



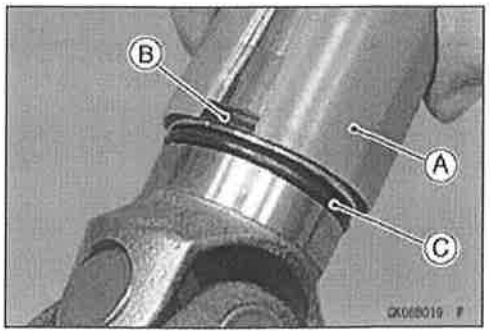
- Slide the O-ring [A] onto the groove [B].



- Set the rareflon ring [A] on the sliding jig [B].
- Place the rareflon ring on the recessed portion [C] of the pusher [D].

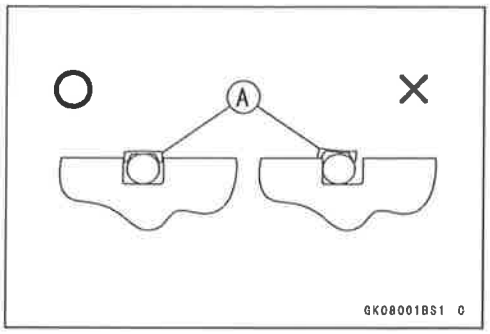


- Slide the pusher [A] until the rareflon ring [B] over the O-ring [C].
- Remove the pusher and sliding jig.

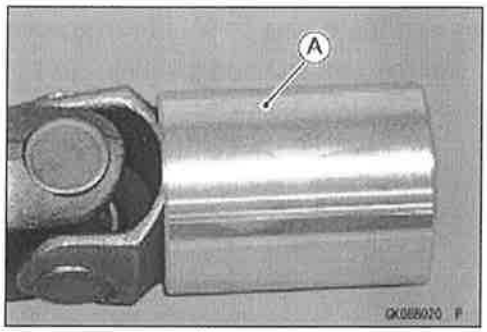


Propeller Shaft

- Fix the rareflon ring [A] on the O-ring uniformly so that it is correctly located in the groove.

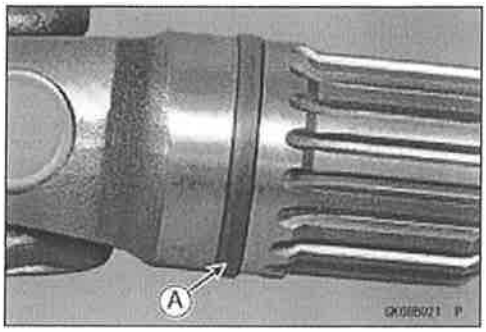


- Apply hypoid gear oil to the tapered portion of the correcting jig.
- Insert the correcting jig [A] until it is bottomed then hold it in place for at least 10 seconds.
- Remove the correcting jig.



- Inspect the rareflon ring [A] for frayed, cracks or cuts.

★If it is damaged, replace it with a new one.

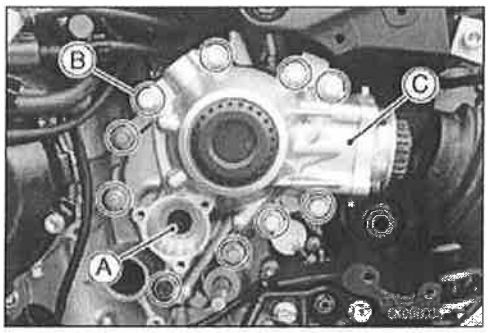


Front Bevel Gears

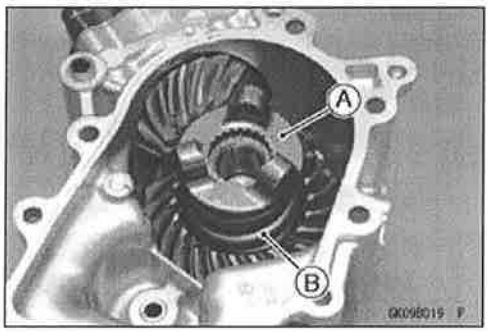
Front Gear Case Removal

- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Propeller Shaft (see Propeller Shaft Removal)
  Water Pump (see Water Pump Removal in the Cooling System chapter)
  Clutch Slave Cylinder (see Clutch Slave Cylinder Removal in the Clutch chapter)
  Speed Sensor (see Speed Sensor Removal in the Electrical System chapter)

- Remove:
  Push Rod [A]
  Front Gear Case Bolts [B] and Washers
  Front Gear Case [C]
  Front Gear Case Gasket
  Dowel Pins



○The cam follower [A] and the damper spring [B] come off with the gear case.

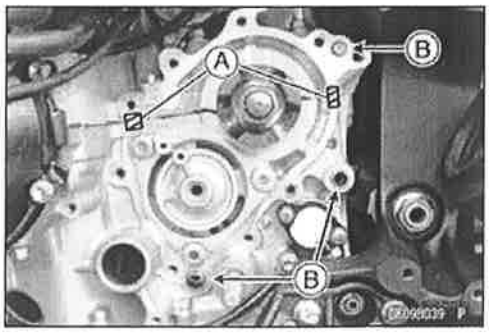


Front Gear Case Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the area [A] where the mating surface of the crankcase touches the front gear case gasket.

  Sealant - Liquid Gasket, TB1211F: 92104-0004

- Be sure to dowel pins [B] are in position.
- Replace the front gear case gasket with a new one and install it.



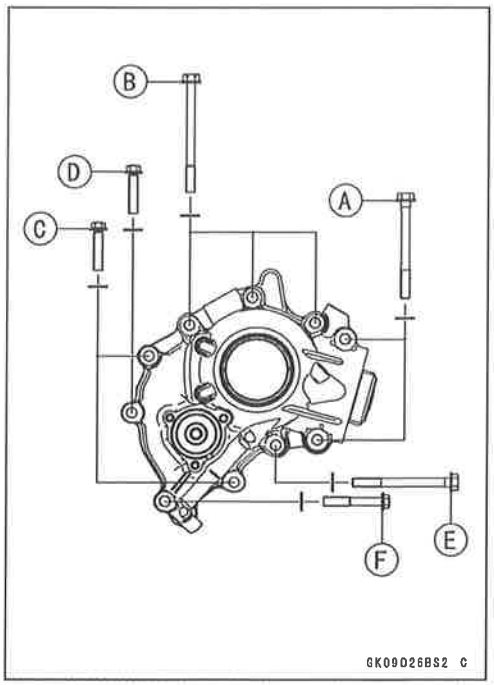
Front Bevel Gears

- Tighten the front gear case bolts to the specified torque.
  Bolts M8 × 92 [A]
  Bolts M8 × 95 [B] [E]
  Bolts M8 × 35 [C] [D]
  Bolt M8 × 50 [F]

○Apply a non-permanent locking agent to the threads of the bolts [A] [D] [E].

Torque - Front Gear Case Bolts:
Bolts [A] [B] [E]: 29 N·m (3.0 kgf·m, 21 ft·lb)
Bolts [C] [D] [F]: 20 N·m (2.0 kgf·m, 15 ft·lb)

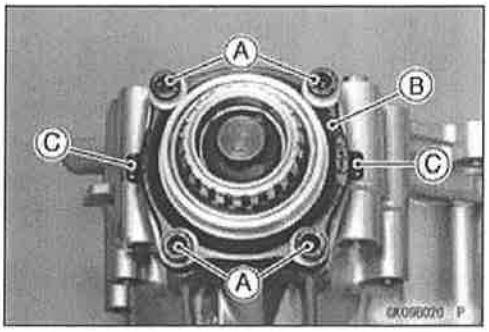
- Install the removed parts (see appropriate chapters).



Front Gear Case Disassembly

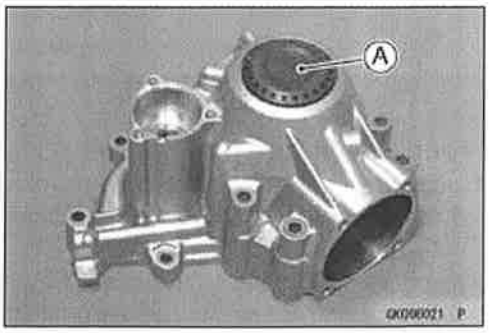
- Remove:
  Front Gear Case (see Front Gear Case Removal)
  Cam Follower (see Front Gear Case Removal)
  Damper Spring (see Front Gear Case Removal)
- Remove the driven gear assy mounting bolts [A] and pry the assy [B] off the case.

○Raise the driven gear, using the following pry points [C].

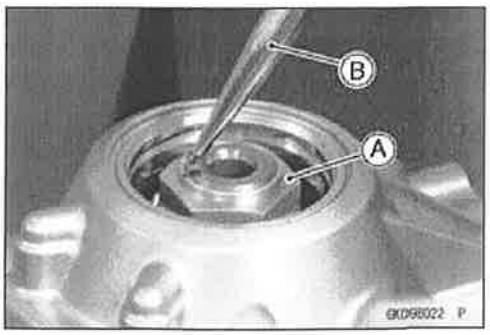


- Remove the drive gear assy as follows.

○Pry off the gear case cap [A] with a tool.



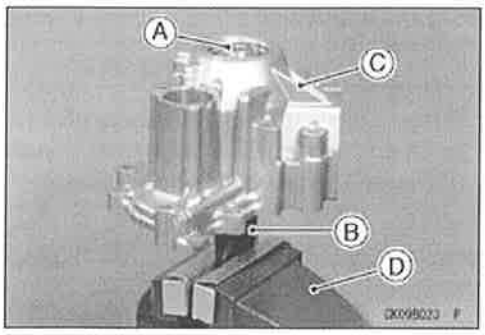
○Pry open the drive gear nut [A] with a small chisel or punch [B].



Front Bevel Gears

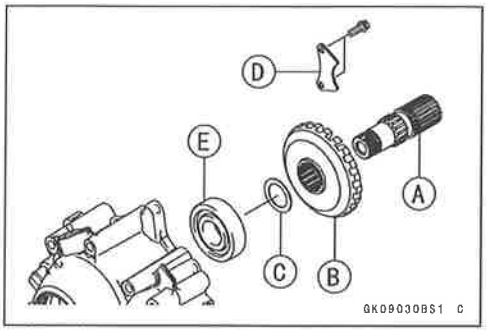
○Remove the drive gear nut [A] while holding the drive gear shaft with the drive gear holder [B].
Front Gear Case [C]
Vise [D]

Special Tool - Drive Gear Holder, m1.25: 57001-1702



- Pull off the drive gear shaft [A], the drive gear [B], and shim(s) [C].
- Remove the bearing holder [D] from the gear case.
- Remove the drive gear shaft ball bearing [E] using the bearing driver set.

Special Tool - Bearing Driver Set: 57001-1129

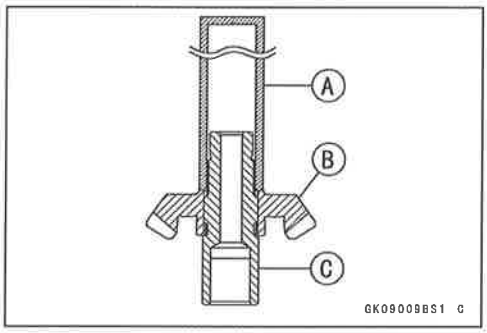


Front Gear Case Assembly

○The drive and driven gear are lapped as a set in the factory to get the best tooth contact. They must be replaced as a set.

- Press the drive gear [B] slowly with the driver [A] onto the shaft [C].

Special Tool - Bearing Driver, ϕ32: 57001-382



- Apply a non-permanent locking agent to the threads of the bearing retainer bolts.
- Tighten:

Torque - Bearing Retainer Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Be sure to check and adjust the bearing preload, the bevel gear backlash, and tooth contact, when any of the backlash-related parts are replaced (see Front Bevel Gear Adjustment).
- After completing all adjustment, reassemble the front gear case.

○Replace the drive gear nut with a new one.
○Apply molybdenum disulfide oil solution to the threads and seating surface of the drive gear nut, and tighten it to the specified torque to settle the bearings in place.
○Loosen the nut completely and retighten it to the specified torque.

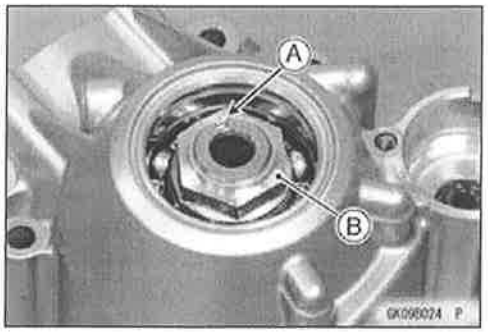
Torque - Drive Gear Nut: 380 N·m (38.7 kgf·m, 280 ft·lb)

Front Bevel Gears

○Stake [A] the nut [B] to secure it in place.

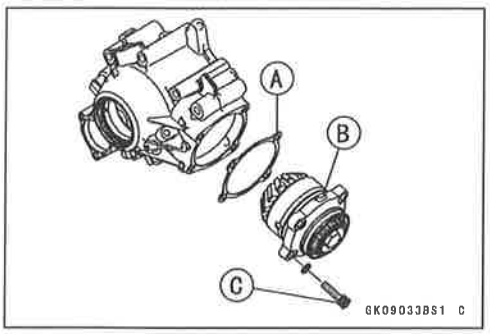
NOTICE

When staking the nut, be careful not to apply shock to the shaft and its bearing. Such a shock could damage the shaft and/or bearing.



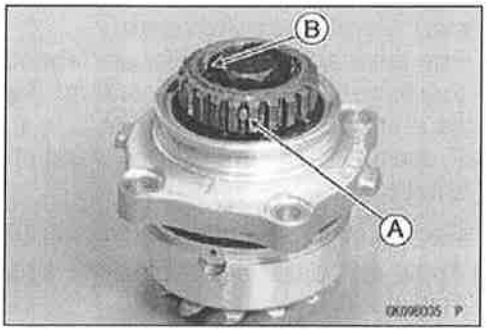
- Install the shim [A].
- Install the driven gear assy prying the pry points [B] up and down side.
- Tighten the driven gear assy mounting bolts [C] to the specified torque.

Torque - Driven Gear Assy Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



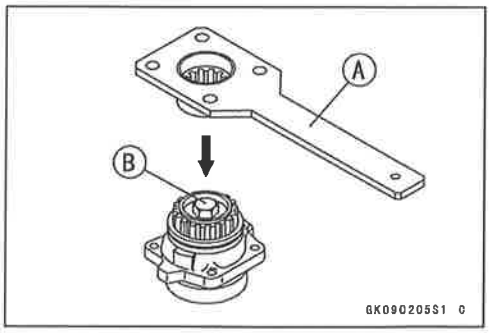
Driven Gear Disassembly

- Remove:
  Pin [A]
  Leaf Spring [B]

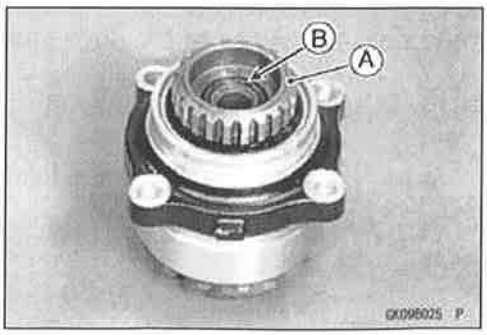


- Holding the driven gear joint with the driven gear holder [A] in a vise, remove the driven gear bolt [B].

Special Tool - Driven Gear Holder, m2: 57001-1027



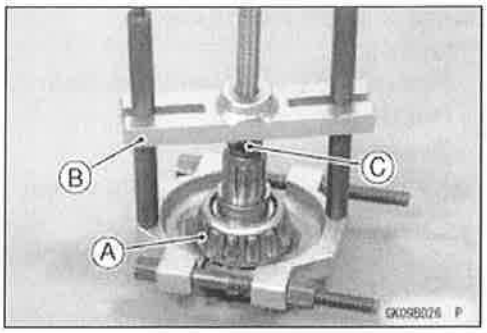
- Remove the driven gear joint [A] with the O-ring [B].
- Remove the driven gear from the bearing housing.
- Remove the oil seal from the housing with a hook, and pull the tapered roller bearing out of the housing.



Front Bevel Gears

- Remove the tapered roller bearing [A] which is pressed onto the driven gear shaft with the bearing puller and adapter.

Special Tools - Bearing Puller: 57001-158 [B]
Bearing Puller Adapter: 57001-317 [C]



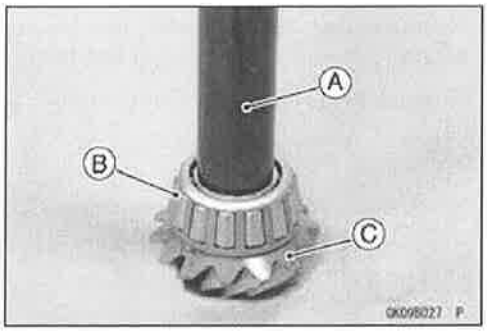
Driven Gear Assembly

- Replace the driven gear bolt with a new one.

○The drive and driven gears are lapped as a set at the factory to get the best tooth contact. They must be replaced as a set.

- Be sure to check and adjust the bearing preload, the bevel gear backlash, and tooth contact (see Front Bevel Gear Adjustment).
- Drive the tapered roller bearing inner race [B] onto the driven gear shaft [C] using the bearing driver [A].

Special Tool - Bearing Driver, ϕ32: 57001-382



- After completing the bearing preload adjustment, reassemble the driven gear assy.

○Using the bearing driver set, press the oil seal in until the face of the seal is level with the end of the bearing housing hole.

Special Tool - Bearing Driver Set: 57001-1129

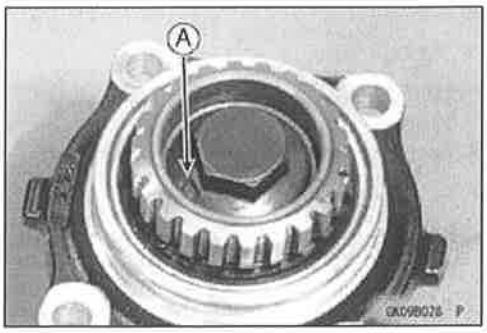
○Replace the O-ring with a new one.

○Apply molybdenum disulfide oil solution to the seating surface of the driven gear bolt.

○Tighten the driven gear bolt to the specified torque.

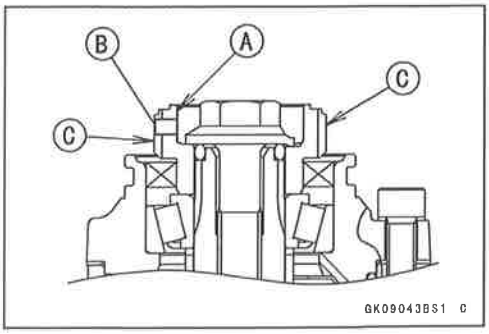
Torque - Driven Gear Bolt: 130 N·m (13.3 kgf·m, 95.9 ft·lb)

○Stake [A] the driven gear bolt to prevent it from loosening.



NOTICE
When staking the bolt, be careful not to apply shock to the driven gear and their bearings. Such a shock could damage the driven gear and/or bearings.

- Install:
  Leaf Spring [A]
  Pin [B]
- Apply molybdenum disulfide grease to the spline [C] of the coupling.

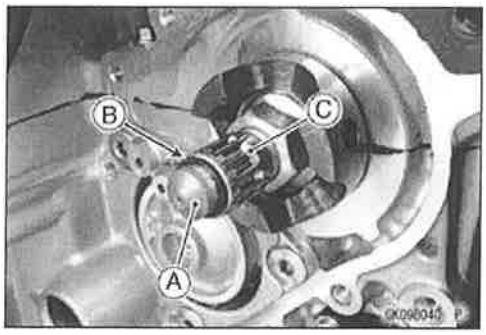


Front Bevel Gears

Damper Cam Removal

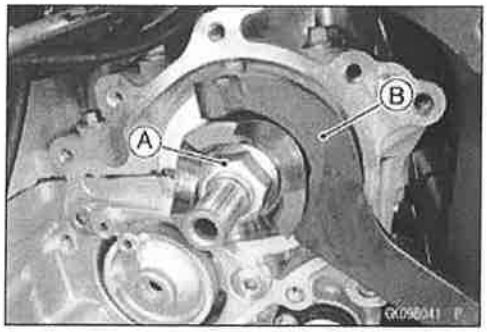
- Remove:
  Front Gear Case (see Front Gear Case Removal)
  Nozzle [A]
  Circlip [B]

  Special Tool - Outside Circlip Pliers: 57001-144
- Remove:
  Needle Bearing [C]



- Remove the damper cam nut [A] using a damper cam holder [B] and deep socket wrench.

  Special Tool - Damper Cam Holder: 57001-1025

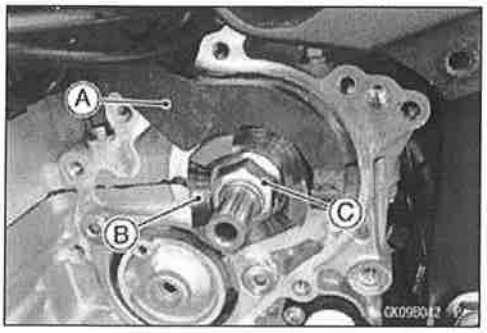


Damper Cam Installation

- Replace the damper cam nut with a new one.
- Fit the damper cam holder [A] onto the damper cam [B].
- Apply molybdenum disulfide oil solution to the threads of the damper cam nut [C].
- Tighten the damper cam nut to the specified torque.

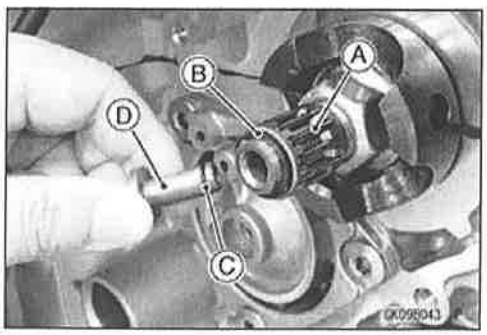
  Torque - Damper Cam Nut: 210 N·m (21.4 kgf·m, 155 ft·lb)

  Special Tool - Damper Cam Holder: 57001-1025



- Install:
  Needle Bearing [A]
  New Circlip [B]

  Special Tool - Outside Circlip Pliers: 57001-144
- Replace the O-ring [C] with a new one and install the nozzle [D].



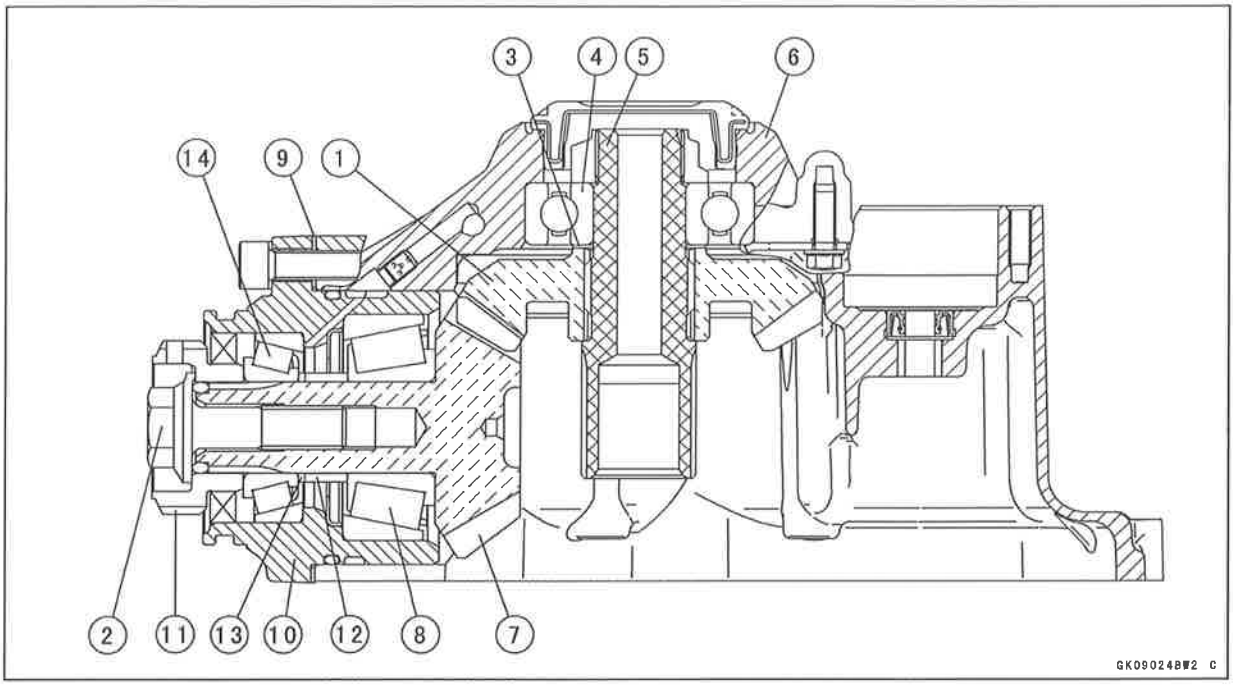
Front Bevel Gear Adjustment

In order to prevent one gear from moving away from the other gear under load, the tapered roller bearings must be properly **preloaded**. Also the **backlash** (the distance one gear will move back and forth without moving the other gear) and **tooth contact pattern** of the bevel gears must be correct to prevent the gears from making noise and being damaged.

Above three adjustments are of critical importance and must be carried out in the correct sequence and method.

○Preload adjustment is necessary whenever the driven gear bolt [2] loosened, even if the purpose is not to replace the parts.

Front Bevel Gears



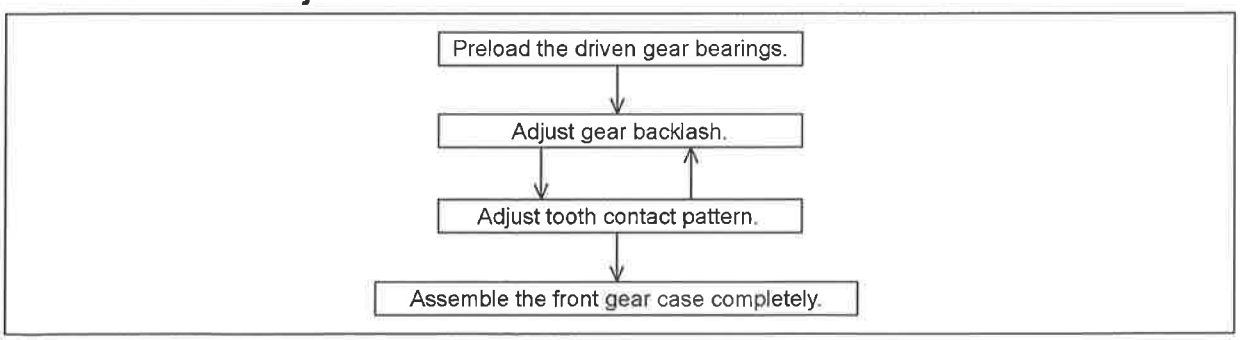
Backlash-related Parts

1. Drive Gear
2. Driven Gear Bolt
3. Drive Gear Shim(s)
4. Ball Bearing
5. Drive Gear Shaft
6. Front Gear Case

Preload-related Parts

7. Driven Gear
8. Tapered Roller Bearing
9. Driven Gear Shim(s)
10. Driven Gear Bearing Housing
11. Driven Gear Joint
12. Collar (Preload Adjustment)
13. Spacer (Preload Adjustment)
14. Tapered Roller Bearing

Front Bevel Gear Adjustment


Preload the driven gear bearings.
Adjust gear backlash.
Adjust tooth contact pattern.
Assemble the front gear case completely.

○When any of the backlash-related parts are replaced, or the driven gear bolt is loosened; even if the purpose is not to replace the parts, be sure to check and adjust the bearing preload, the bevel gear backlash, and tooth contact by replacing shims.

Front Bevel Gears

Preload Adjustment

- Install the driven gear assy, and tighten the driven gear bolt to the specified torque.

Torque - Driven Gear Bolt: 130 N·m (13.3 kgf·m, 95.9 ft·lb)

○Do not install the oil seal, and O-ring, and do not stake the bolt until the correct bearing preload is obtained.

NOTICE

To start with, choose a shim or collar so that the bearings are just SNUG with NO play and also with NO preload.
Any overpreload on the bearings could damage the bearings.

- Apply a little engine oil to the bearings, and turn the gear shaft more than 5 turns to allow the bearings to seat.
- Measure the bearing preload. Bearing preload is defined as a force or torque which is needed to start the gear shaft turning.

Preload for Driven Gear Bearing
Using Torque Wrench:
0.49 ~ 0.88 N·m (0.05 ~ 0.09 kgf·m, 4.34 ~ 7.81 in·lb)
Using Spring Scale:
2.45 ~ 4.41 N (0.25 ~ 0.45 kgf, 0.55 ~ 0.99 lb)

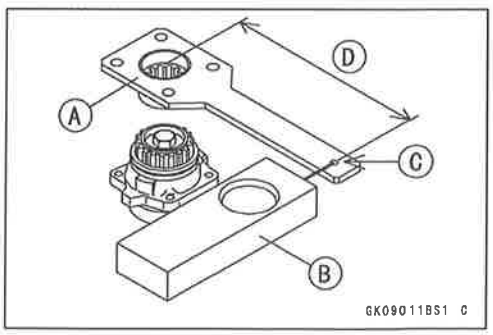
NOTE

○*Preload can be measured either with a spring scale or a beam-type torque wrench. When measured with a spring scale, the preload is designated by force (N, kgf, lb), and when measured with a torque wrench, it is designated by torque (N·m, kgf·m, in·lb).*

Preload Measurement with Spring Scale

- Hold the bearing housing in a vise so that the gear shaft axis is vertical.
- Hook [C] the spring scale [B] on the driven gear holder [A] at a point 200 mm (7.9 in.) [D] apart from the center of the gear shaft.
- Apply force to the handle horizontally and at a right angle to it.

Special Tool - Driven Gear Holder, m2: 57001-1027



★If the preload is out of specified range, replace the bearing collar and/or spacer. To increase preload, decrease the stack length of the collar and spacer. To decrease preload, increase the stack length of the collar and spacer.
★Change the stack length a little at a time.
- Recheck the bearing preload, and readjust if necessary.

Front Bevel Gears

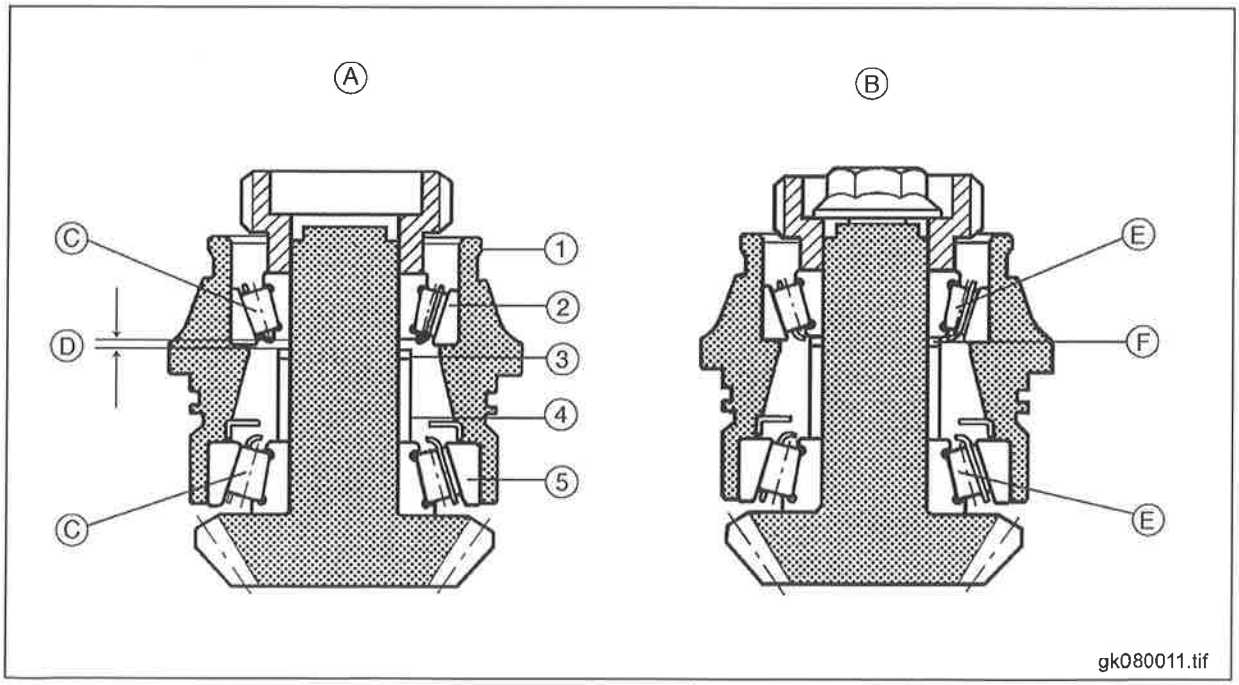
Collars for Preload Adjustment

Length (mm)	Part Number
10.4 (0.409 in.)	92027-1403
10.5 (0.413 in.)	92027-1404
10.6 (0.417 in.)	92027-1405
10.7 (0.421 in.)	92027-1406
10.8 (0.425 in.)	92027-1407
10.9 (0.429 in.)	92027-1408
11.0 (0.433 in.)	92027-1409
11.1 (0.437 in.)	92027-1410
11.2 (0.441 in.)	92152-0480
11.3 (0.445 in.)	92152-0481
11.4 (0.449 in.)	92152-0482
11.5 (0.453 in.)	92152-0483
11.6 (0.457 in.)	92152-0484
11.7 (0.461 in.)	92152-0485

Spacers for Preload Adjustment

Thickness (mm)	Part Number
1.70 (0.0669 in.)	92025-1072
1.72 (0.0677 in.)	92025-1073
1.74 (0.0685 in.)	92025-1074
1.76 (0.0693 in.)	92025-1075
1.78 (0.0701 in.)	92025-1076
1.80 (0.0709 in.)	92025-1077

Bearing Preloading Mechanism



1. Bearing Housing
2. Tapered Roller Bearing
   Before Tightening [A]
   After Tightening [B]
3. Spacer
4. Collar
   Under No Preload [C]
   Initial Clearance [D]
5. Tapered Roller Bearing
   Under Preload [E]
   No Clearance [F]

Front Bevel Gears

Backlash Adjustment

- Clean any dirt and oil off bevel gear teeth with a high flash-point solvent.
- Install the drive gear with the primary shim (1.0 mm, 0.04 in., thickness), and tighten the nut to the specified torque.

Torque - Drive Gear Nut: 380 N·m (38.7 kgf·m, 280 ft·lb)

NOTE

○*Do not stake the head of the nut until both backlash and tooth contact adjustments are finished.*

- Install the driven gear assy in the front gear case with the primary shim (1.0 mm, 0.04 in., thickness), and tighten the mounting bolts to the specified torque.

Torque - Driven Gear Assy Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

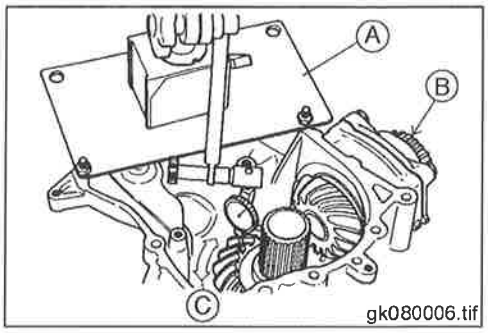
○Check backlash during tightening of the mounting bolts, and stop tightening them immediately if the backlash disappears. Then, change the shim to a thicker one.

- Install a holder [A] with 6 mm bolts and nuts on the front gear case to mount a dial gage.
- Set up a dial gage against a drive gear tooth to check gear backlash. The gage stem must be in line with the direction of tooth travel.
- To measure the backlash, move the drive gear back and forth [C] while holding [B] the driven gear steady with a tool. The difference between the highest and lowest gage readings is the amount of backlash.

★If the backlash is not within the limit, replace the gear shim(s) at the drive and/or driven gear. To increase backlash, increase the thickness of the shim(s). To decrease backlash, decrease the thickness of the shim(s).

★Change the thickness a little at a time.

- Recheck the backlash, and readjust as necessary.



NOTE

○*It is OK to pack two shims. Do not pack three or more shims.*

Front Bevel Gear Backlash (at Drive Gear Tooth)
0.10 ~ 0.20 mm (0.0039 ~ 0.0079 in.)

Shims for Drive Gear

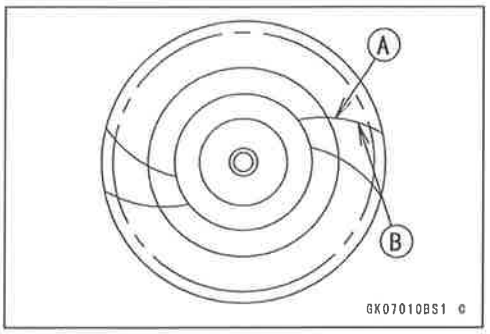
Thickness (mm)	Parts Number
0.15 (0.0059 in.)	92025-1688
0.5 (0.020 in.)	92025-1689
0.6 (0.024 in.)	92025-1690
0.7 (0.028 in.)	92025-1691
0.8 (0.031 in.)	92025-1692
0.9 (0.035 in.)	92025-1693
1.0 (0.039 in.)	92025-1694
1.1 (0.043 in.)	92025-1695
1.2 (0.047 in.)	92025-1696

Shims for Driven Gear

Thickness (mm)	Parts Number
0.1 (0.0039 in.)	92180-0227
0.15 (0.0059 in.)	92180-0228
0.5 (0.020 in.)	92180-0229
0.6 (0.024 in.)	92180-0230
0.7 (0.028 in.)	92180-0231
0.8 (0.031 in.)	92180-0232
0.9 (0.035 in.)	92180-0233
1.0 (0.039 in.)	92180-0234
1.2 (0.047 in.)	92180-0235

Front Bevel Gears

Tooth Contact Adjustment



- Clean any dirt and oil off the bevel gear teeth with a high flash-point solvent.
- Apply checking compound to 4 or 5 teeth on the driven gear.
  Convex Side Tooth [A]
  Concave Side Tooth [B]

NOTE

○*Apply checking compound to the teeth in a thin, even coat with a fairly stiff paint brush. If painted too thickly, the exact tooth pattern may not appear.*
○*The checking compound must be smooth and firm, with the consistency of tooth paste.*
○*Special compounds are available from automotive supply stores for the purpose of checking differential gear tooth patterns and contact. Use this for checking the bevel gears.*

- Turn the driven gear for 3 or 4 revolutions back and forth, while creating a drag on the drive gear.
- Check the convex side pattern and concave side pattern of the bevel gear teeth. Good contact is achieved when the center line of the tooth contact pattern is visible in the inside of the lines shown in the figure below.

★ If the tooth contact pattern is incorrect, replace the shim(s) at the driven gear and shim(s) at the driven gear. Then erase the tooth contact patterns, and check them again. Also check the backlash every time the shims are replaced. Repeat the shim change procedure as necessary.

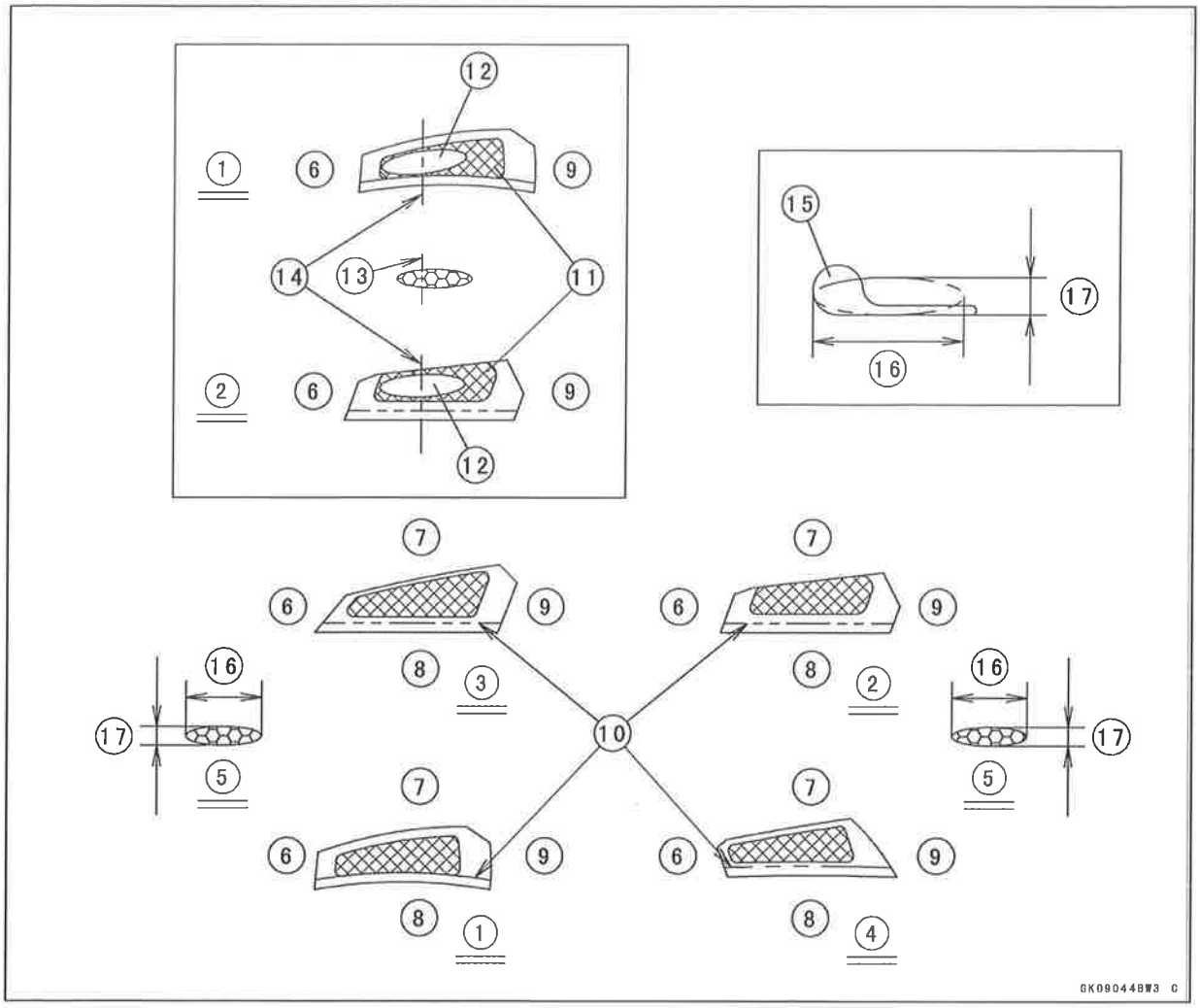
NOTE

○*If the backlash goes out of standard range after changing shims, correct the backlash before checking the tooth contact pattern.*
○*It is OK to pack two shims. Do not pack three or more shims.*

- After checking the tooth contact pattern, check the pinion gear turns freely.

Front Bevel Gears

Correct Tooth Contact Pattern: No adjustment is required



1. Concave Side of Pinion Gear
2. Convex Side of Ring Gear
3. Convex Side of Pinion Gear
4. Concave Side of Ring Gear
5. Limit of Good Contact Pattern
6. Inside
7. Top
8. Bottom
9. Outside
10. Top of Engagement Tooth
11. Area of Good Contact Pattern
12. Aiming Position of Tooth Contact
13. Center Line of Tooth Contact Pattern
14. The center line of tooth contact pattern must come to inside of the line shown in the figure.
15. The extreme pattern like figure is improper.
16. 16 mm (0.63 in.)
17. 3 mm (0.12 in.)

Bevel Gear Inspection

- Visually check the bevel gears for scoring, chipping, or other damage.

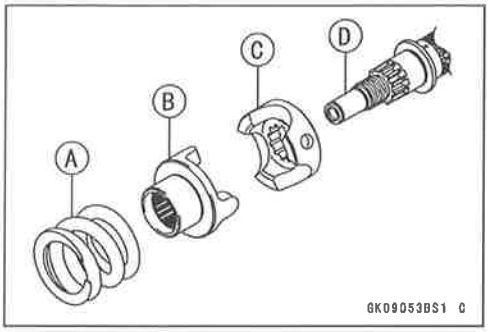
★Replace the bevel gears as a set if either gear is damaged.

Front Bevel Gears

Cam Damper Inspection

- Visually inspect the spring [A], cam follower [B], damper cam [C], and output shaft [D].

★Replace the damaged parts.



Bearing and Oil Seal

Ball or Needle Bearing Replacement

- Using the bearing driver set or the oil seal & bearing remover, remove the bearings.

Special Tools - Oil Seal & Bearing Remover: 57001-1058
Bearing Driver Set: 57001-1129

NOTE

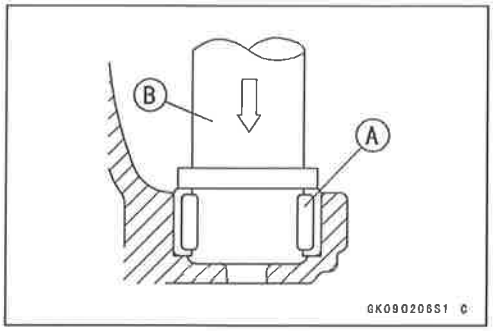
○*In the absence of the above mentioned tools, satisfactory results may be obtained by heating the case to approximately 93°C (200°F) max., and tapping the bearing in or out.*

NOTICE

Do not heat the case with a blowtorch. This will warp the case. Soak the case in oil and heat the oil.

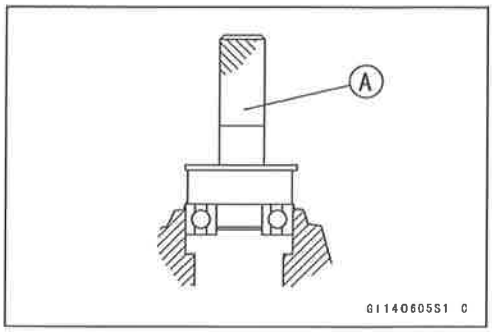
- Install a new needle bearing [A] with the marked side facing out until it bottoms out, using the bearing driver set [B]. This prevents bearing damage.

Special Tool - Bearing Driver Set: 57001-1129



- Using a press and the bearing driver set [A], install a new ball bearing until it stops at the bottom of the case.

Special Tool - Bearing Driver Set: 57001-1129



Ball Bearing Wear Inspection

NOTICE

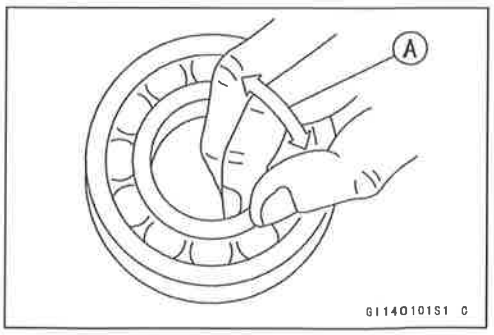
Do not remove the bearings for inspection. Removal may damage them.

- Check the ball bearings.

○Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.

○Spin [A] the bearing by hand to check its condition.

★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.



Bearing and Oil Seal

Tapered Roller Bearing Inspection

NOTICE
Do not remove the tapered roller bearing for inspection. Removal may damage them.

- Visually inspect the bearing in the front for abrasion, color change, or other damage.

★If there is any doubt as to the condition of the bearing, replace it.

Needle Bearing Inspection

NOTICE
Do not remove the needle bearing in the final gear case for inspection. Removal may damage them.

- Check the needle bearings in the damper cam and final gear cases.

○The rollers in the needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of a needle bearing, replace it.

Oil Seal Inspection

- Inspect the oil seals.

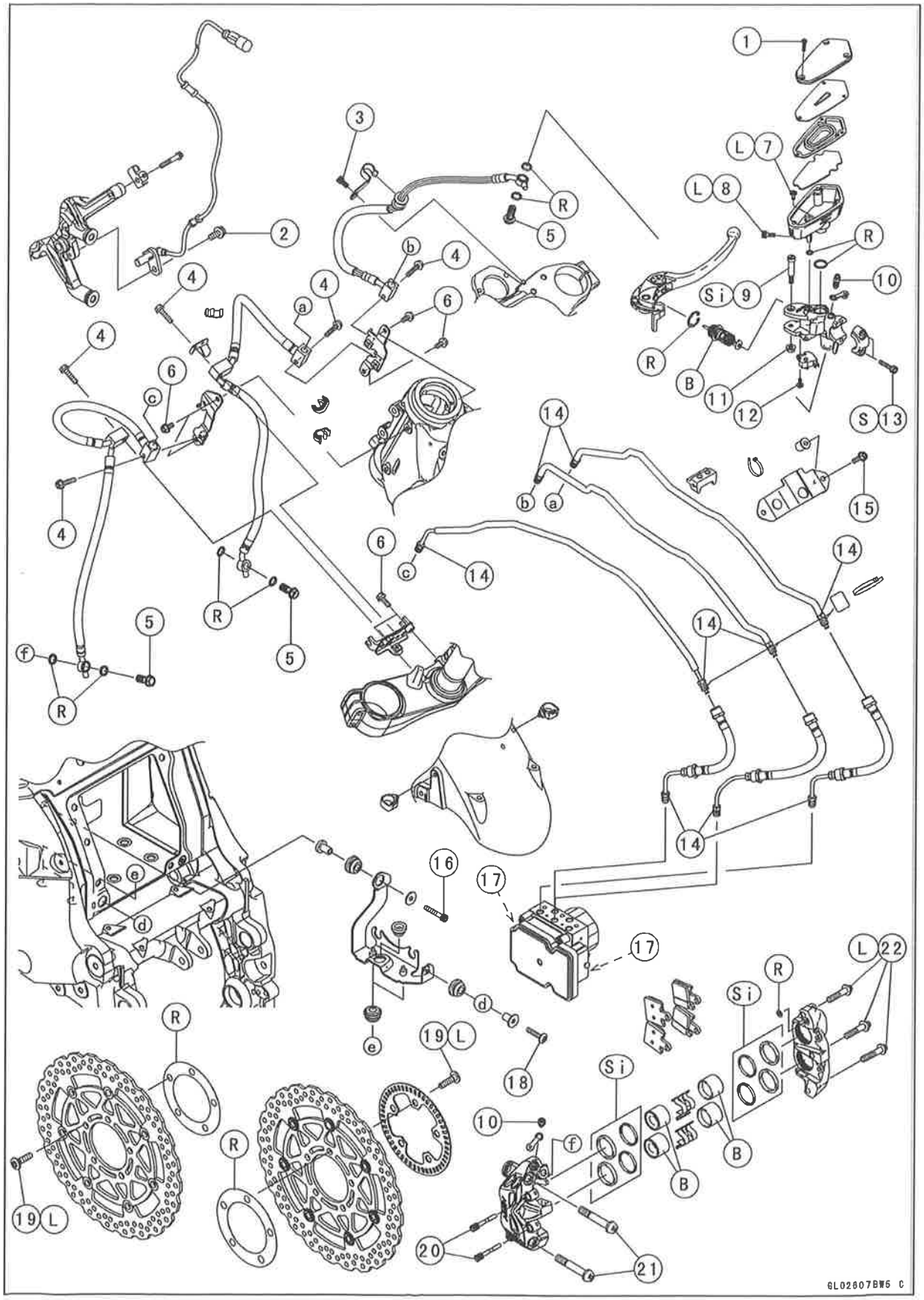
★Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

Brakes

Table of Contents

Exploded View 12-2
Specifications 12-6
Special Tool 12-7
Brake Lever, Brake Pedal 12-8
  Brake Lever Position Adjustment. 12-8
  Brake Pedal Position Inspection . 12-8
  Brake Pedal Position Adjustment. 12-8
  Brake Pedal Removal 12-9
  Brake Pedal Installation 12-9
Calipers 12-11
  Front Caliper Removal 12-11
  Rear Caliper Removal 12-11
  Caliper Installation 12-12
  Front Caliper Disassembly 12-12
  Front Caliper Assembly 12-12
  Rear Caliper Disassembly 12-12
  Rear Caliper Assembly 12-12
  Caliper Fluid Seal Damage Inspection 12-13
  Caliper Dust Seal Damage Inspection 12-13
  Caliper Piston and Cylinder Damage Inspection 12-14
Brake Pads 12-15
  Front Brake Pad Removal 12-15
  Front Brake Pad Installation 12-15
  Rear Brake Pad Removal 12-16
  Rear Brake Pad Installation 12-16
  Brake Pad Wear Inspection 12-16
Master Cylinder 12-17
  Front Master Cylinder Removal ... 12-17
  Front Master Cylinder Installation 12-17
  Rear Master Cylinder Removal 12-18
  Rear Master Cylinder Installation. 12-18
  Front Master Cylinder Disassembly 12-18
  Rear Master Cylinder Disassembly 12-18
  Master Cylinder Assembly 12-18
  Master Cylinder Inspection (Visual Inspection) 12-19
Brake Disc 12-20
  Brake Disc Removal 12-20
  Brake Disc Installation 12-20
  Brake Disc Wear Inspection 12-20
  Brake Disc Warp Inspection 12-20
Brake Fluid 12-21
  Brake Fluid Level Inspection 12-21
  Brake Fluid Change 12-21
  Brake Line Bleeding 12-21
Brake Hose 12-25
  Brake Hose and Pipe Removal/Installation 12-25
  Brake Hose and Pipe Inspection.. 12-25
K-ACT ABS 12-26
  Parts Location 12-26
  K-ACT ABS Servicing Precautions 12-30
  K-ACT ABS Troubleshooting Outline 12-32
  Inquiries to Rider 12-35
  Self-diagnosis Outline 12-39
  Yellow K-ACT ABS Indicator Light (LED) Inspection 12-39
  K-ACT ABS Hydraulic Unit Removal 12-40
  K-ACT ABS Hydraulic Unit Installation 12-44
  K-ACT ABS Hydraulic Unit Inspection 12-46
  Front Wheel Rotation Sensor Removal 12-46
  Front Wheel Rotation Sensor Installation 12-47
  Rear Wheel Rotation Sensor Removal 12-47
  Rear Wheel Rotation Sensor Installation 12-48
  Wheel Rotation Sensor Inspection 12-48
  Wheel Rotation Sensor Air Gap Inspection 12-49
  Wheel Rotation Sensor Rotor Removal 12-49
  Wheel Rotation Sensor Rotor Installation 12-49
  Wheel Rotation Sensor Rotor Inspection 12-49
  K-ACT ABS Solenoid Valve Relay Fuse (20 A) Removal 12-50
  K-ACT ABS Motor Relay Fuse (30 A) Removal 12-50
  Fuse Installation 12-50
  Fuse Inspection 12-50

Exploded View



Exploded View

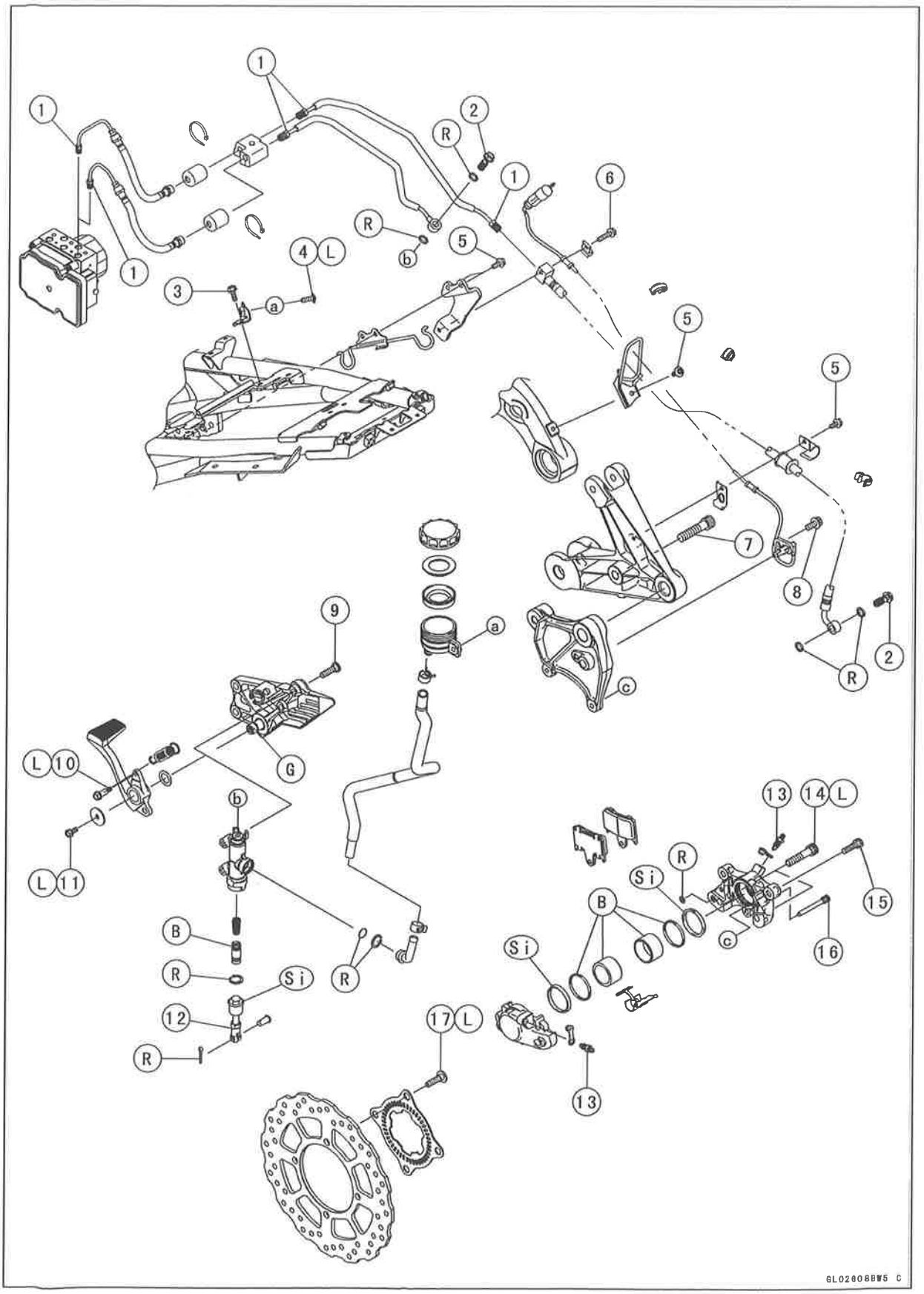
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
2	Front Wheel Rotation Sensor Bolt	25	2.5	18	
3	Brake Hose Clamp Bolt	8.0	0.82	71 in·lb	
4	Brake Hose Joint Bolts	8.0	0.82	71 in·lb	
5	Brake Hose Banjo Bolts	25	2.5	18	
6	Brake Hose Joint Bracket Bolts	8.0	0.82	71 in·lb	
7	Brake Reservoir Screw	1.3	0.13	12 in·lb	L
8	Brake Reservoir Bolt	7.8	0.80	69 in·lb	L
9	Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si
10	Bleed Valves	8.0	0.82	7.1 in·lb	
11	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
12	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
13	Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S
14	Brake Pipe Joint Nuts	18	1.8	13	
15	Brake Pipe Bracket Bolts	1.0	0.10	8.9 in·lb	
16	K-ACT ABS Hydraulic Unit Bracket Bolt (L = 35 mm)	7.0	0.71	62 in·lb	
17	K-ACT ABS Hydraulic Unit Nuts	7.0	0.71	62 in·lb	
18	K-ACT ABS Hydraulic Unit Bracket Bolt (L = 30 mm)	7.0	0.71	62 in·lb	
19	Front Brake Disc Mounting Bolts	28	2.9	21	L
20	Front Brake Pad Pins	17.2	1.75	12.7	
21	Front Caliper Mounting Bolts	35	3.6	26	
22	Front Caliper Assembly Bolts	27	2.8	20	L

B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

NOTE

○*When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.*

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Pipe Joint Nuts	18	1.8	13	
2	Brake Hose Banjo Bolts	25	2.5	18	
3	Rear Brake Reservoir Bracket Bolt	8.0	0.82	71 in·lb	
4	Rear Brake Reservoir Mounting Bolt	4.0	0.41	35 in·lb	L
5	Brake Hose Clamp Bolts	8.0	0.82	71 in·lb	
6	Brake Hose Joint Bolt	8.0	0.82	71 in·lb	
7	Caliper Bracket Bolt	65	6.6	48	
8	Rear Wheel Rotation Sensor Bolt	25	2.5	18	
9	Rear Master Cylinder Mounting Bolts	25	2.5	18	
10	Rear Brake Spring Bolt	8.0	0.82	35 in·lb	L
11	Brake Pedal Bolt	9.0	0.92	80 in·lb	L
12	Rear Master Cylinder Push Rod Locknut	17.2	1.75	12.7	
13	Bleed Valves	8.0	0.82	71 in·lb	
14	Rear Caliper Assembly Bolts	37	3.8	27	L
15	Rear Caliper Mounting Bolts	25	2.5	18	
16	Rear Brake Pad Pin	17.2	1.75	12.7	
17	Rear Brake Disc Mounting Bolts	28	2.9	21	L

B: Apply brake fluid.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
Si: Apply silicone grease.

NOTE

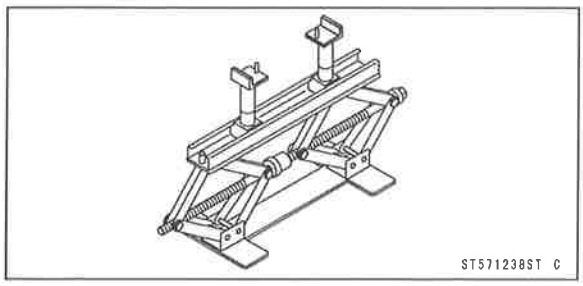
○*When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.*

Specifications

Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Position	6-way adjustable (to suit rider)	– – –
Brake Lever Free Play	Non-adjustable	– – –
Brake Pedal Free Play	Non-adjustable	– – –
Brake Pedal Position	About 35 mm (1.4 in.) below top of footpeg	– – –
Brake Pads		
Lining Thickness:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	5.0 mm (0.20 in.)	1 mm (0.04 in.)
Brake Discs		
Thickness:		
Front	4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Rear	5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)	5 mm (0.20 in.)
Runout:	TIR 0.15 mm (0.0059 in.) or less	TIR 0.3 mm (0.01 in.)
Brake Fluid		
Grade	DOT4	– – –
K-ACT ABS		
K-ACT ABS Hydraulic Unit:		
Make	BOSCH	– – –
Wheel Rotation Sensor Air Gap:		
Front	0.4 ~ 1.6 mm (0.015 ~ 0.063 in.)	– – –
Rear	0.4 ~ 1.6 mm (0.015 ~ 0.063 in.)	– – –

Special Tool

Jack:
57001-1238



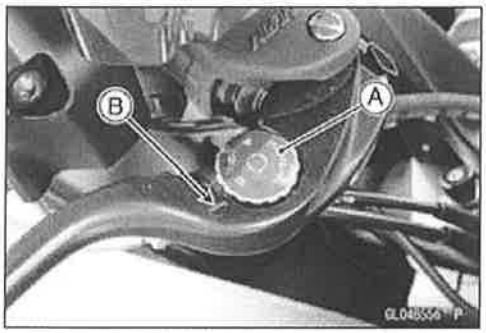
Brake Lever, Brake Pedal

Brake Lever Position Adjustment

The brake lever adjuster has 6 positions so that the brake lever position can be adjusted to suit the operator's hand.

- Push the lever forward and turn the adjuster [A] to align the number with the arrow mark [B] on the lever holder.

○The distance from the grip to the lever is minimum at number 6 and maximum at number 1.

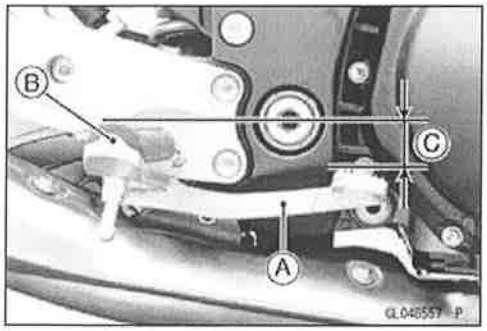


Brake Pedal Position Inspection

- Check that the brake pedal [A] is in the correct position.
  Footpeg [B]

Pedal Position
Standard: About 35 mm (1.4 in.) [C] below top of footpeg

★If it is incorrect, adjust the brake pedal position.



Brake Pedal Position Adjustment

NOTE

○*Usually it is not necessary to adjust the pedal position, but always adjust it when push rod locknut has been loosened*

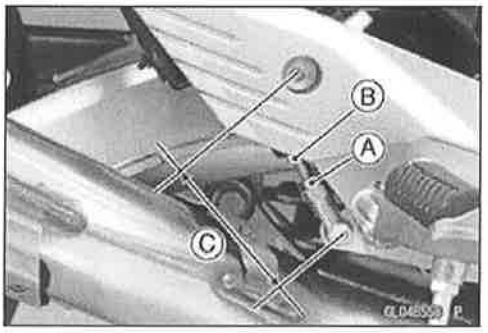
- Remove:
  Exhaust Pipe Cover (see Exhaust Pipe Cover Removal/Installation in the Engine Top chapter)
- Loosen the locknut [A] and turn the push rod with the hex head [B] to achieve the correct pedal position.

★If the length [C] shown is 80 ±1 mm (3.15 ±0.04 in.), the pedal position will be within the standard range.

- Tighten:

Torque - Rear Master Cylinder Push Rod Locknut: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)

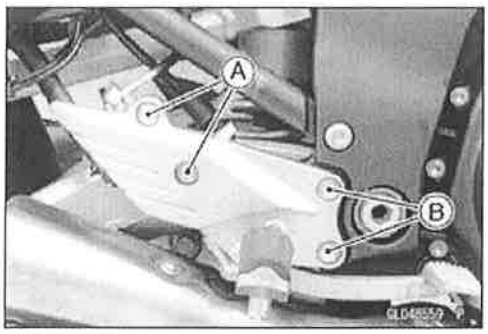
- Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).
- Install the exhaust pipe cover (see Exhaust Pipe Cover Removal/Installation in the Engine Top chapter).



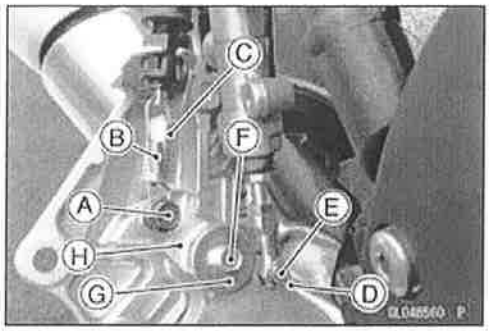
Brake Lever, Brake Pedal

Brake Pedal Removal

- Remove:
  Rear Master Cylinder Mounting Bolts [A]
  Right Footpeg Bracket Bolts [B]



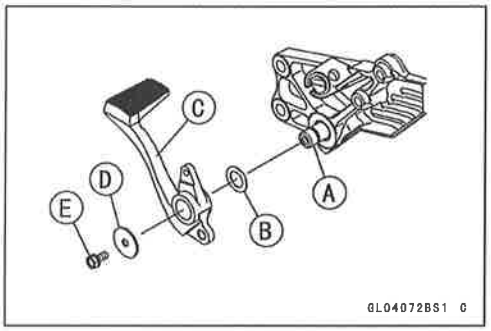
- Remove:
  Hook Bolt [A]
  Rear Brake Light Switch Spring [B]
  Return Spring [C]
  Cotter Pin [D]
  Joint Pin [E]
  Brake Pedal Bolt [F]
  Washer [G]
  Brake Pedal [H]



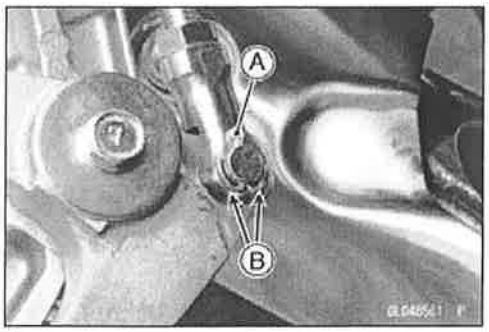
Brake Pedal Installation

- Apply a non-permanent locking agent to the brake pedal bolt.
- Apply grease to the pivot shaft [A] and install the washer [B].
- Install:
  Brake Pedal [C]
  Washer [D]
  Brake Pedal Bolt [E]

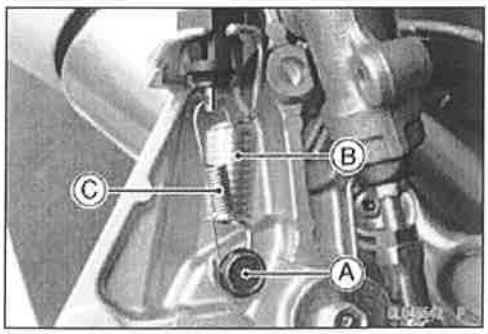
Torque - Brake Pedal Bolt: 9.0 N·m (0.92 kgf·m, 80 in·lb)



- Replace the cotter pin [A] with a new one.
- Insert the cotter pin and bend the pin ends [B].



- Apply a non-permanent locking agent to the hook bolt [A] and tighten it.
- Hook the lower ends of the return spring [B] and rear brake light switch spring [C] as shown.



Brake Lever, Brake Pedal

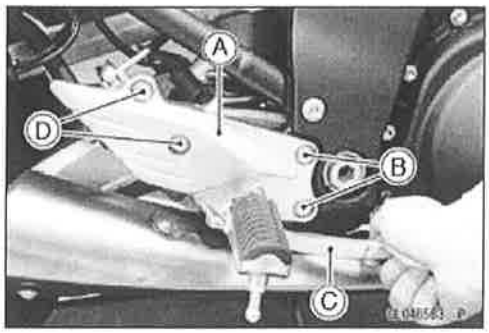
- Install the right footpeg bracket [A].

  Torque - Front Footpeg Bracket Bolts [B]: 25 N·m (2.5 kgf·m, 18 ft·lb)

○Depress the brake pedal [C] and then align the bolts holes of the master cylinder.

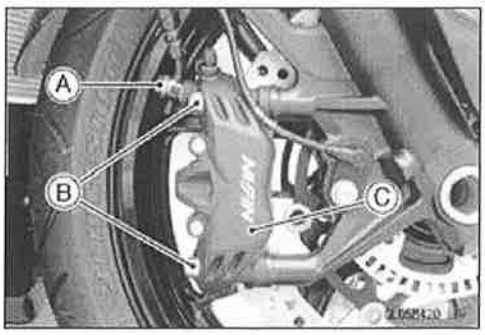
Torque - Rear Master Cylinder Mounting Bolts [D]: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Check the brake pedal position (see Brake Pedal Position Inspection).



Calipers

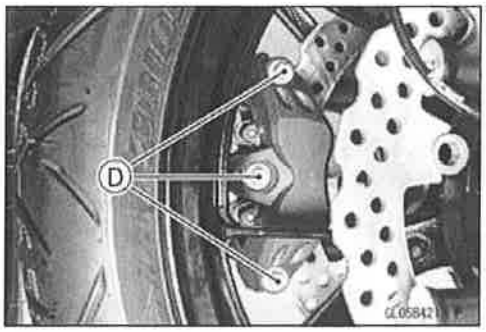
Front Caliper Removal



- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [B], and detach the caliper [C] from the disc.

NOTICE

Do not loosen the caliper assembly bolts [D]. Take out only the caliper mounting bolts for caliper removal. Loosening the caliper assembly bolts will cause brake fluid leakage.



- Remove the banjo bolt and remove the brake hoses from the caliper (see Brake Hose Removal/Installation).

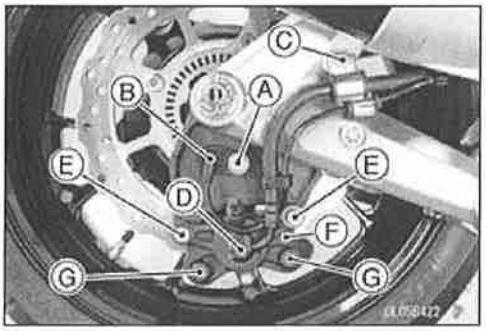
NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

NOTE

○*If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Front Caliper Disassembly).*

Rear Caliper Removal



- Remove:
  Rear Wheel Rotation Sensor Bolt [A]
  Rear Wheel Rotation Sensor [B]
  Brake Hose Clamp Bolt [C]
- Loosen the banjo bolt [D] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [E], and detach the caliper [F] from the disc.

NOTICE

Do not loosen the caliper assembly bolts [G]. Take out only the caliper mounting bolts for caliper removal. Loosening the caliper assembly bolts will cause brake fluid leakage.

- Remove the banjo bolt and remove the brake hose from the caliper (see Brake Hose Removal/Installation).

NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

NOTE

○*If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Rear Caliper Disassembly).*

Calipers

Caliper Installation

- Install the caliper and brake hose lower end.

○Replace the washers on each side of hose fitting with new ones.

- Tighten:

Torque - Caliper Mounting Bolts
Front: 35 N·m (3.6 kgf·m, 26 ft·lb)
Rear: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Clamp Bolt: 8.0 N·m (0.82 kgf·m, 71 in·lb)

- Check the fluid level in the brake reservoirs.
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

After servicing, it takes several applications of the brake lever or pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever or pedal is obtained by pumping the lever or pedal until the pads are against the disc.

Front Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Front Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Calipers

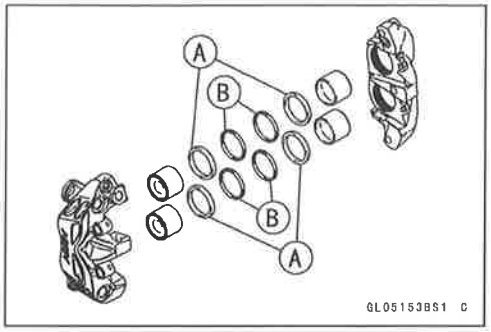
Caliper Fluid Seal Damage Inspection

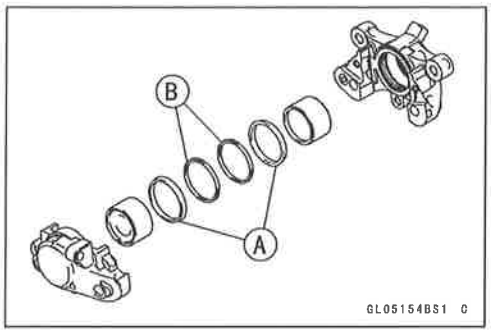
The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

- Replace the fluid seal if it exhibits any of the conditions listed below.

○Brake fluid leakage around the pad.
○Brakes overheat.
○Considerable difference in inner and outer pad wear.
○Seal and piston are stuck together.

★If the fluid seal is replaced, replace the dust seal [B] as well. Also, replace all seals every other time the pads are changed.



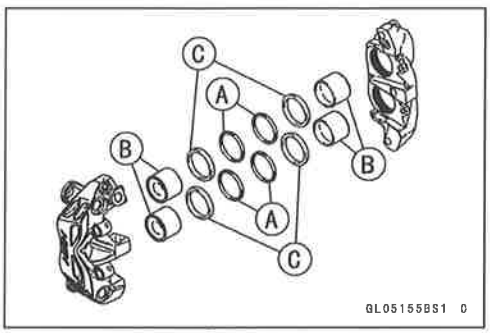


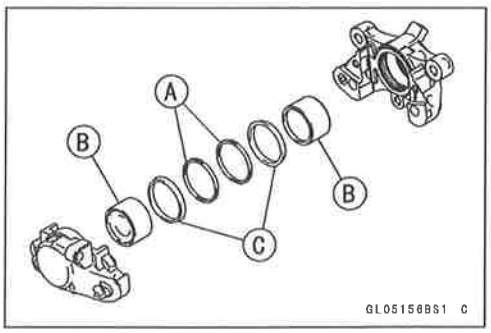
Caliper Dust Seal Damage Inspection

- Check that the dust seals [A] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace the dust seals with new ones.

Pistons [B]
Fluid Seals [C]



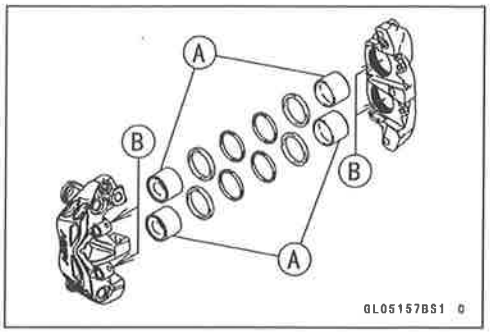


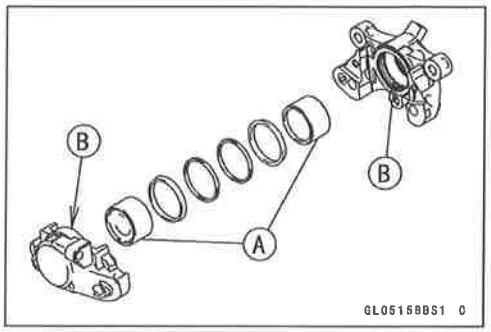
Calipers

Caliper Piston and Cylinder Damage Inspection

- Visually inspect the pistons [A] and cylinder surfaces [B].

★ Replace the caliper if the cylinder and piston are badly scores or rusty.

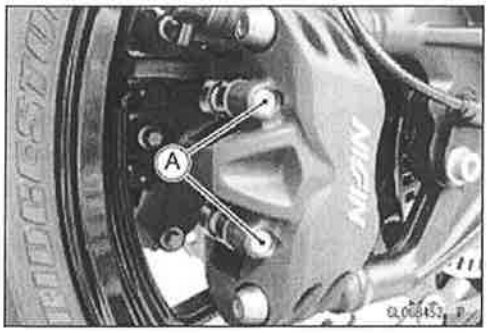




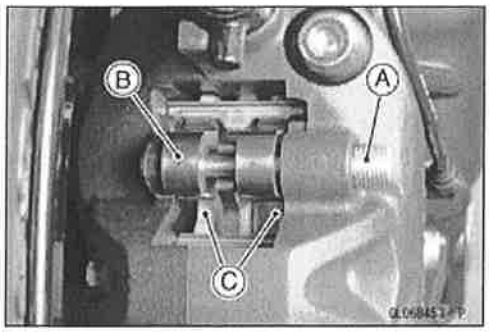
Brake Pads

Front Brake Pad Removal

- Remove:
  Pad Pins [A]

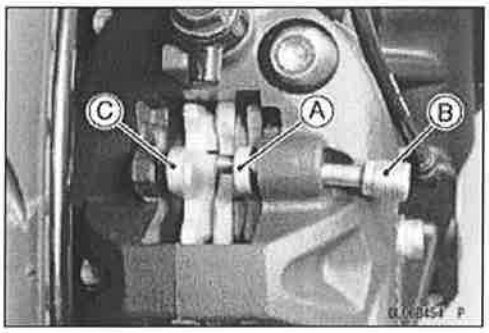


- Remove:
  Pad Pins [A]
  Pad Springs [B]
  Brake Pads [C]



Front Brake Pad Installation

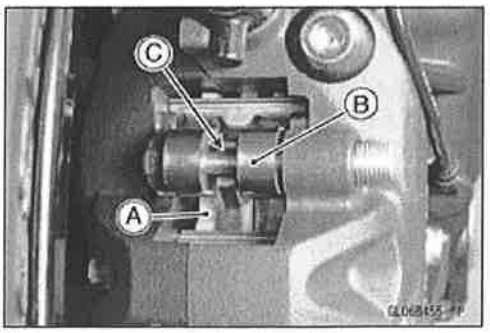
- Push the caliper pistons in by hand as far as they will go.
- Install the outside pad [A] and insert the pad pin [B] as shown.
- Insert the inside pad [C].



- Set:
  Inside Pad [A]
  Pad Spring [B]

○Pushing the pin holder [C] to hole of the pad and insert the pad pin.

Torque - Front Brake Pad Pins: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)



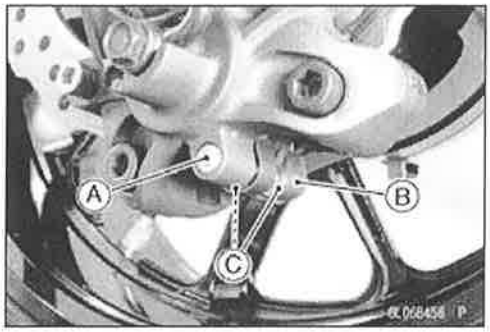
⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Brake Pads

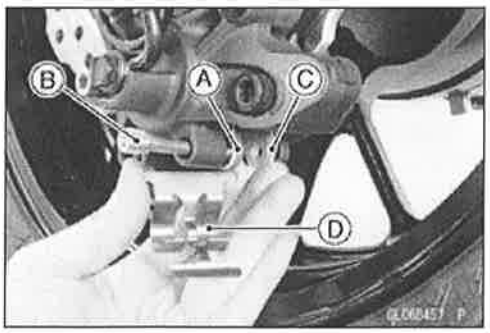
Rear Brake Pad Removal

- Remove:
  Pad Pin [A]
  Pad Spring [B]
  Brake Pads [C]



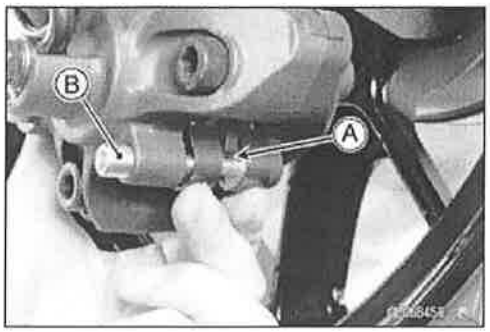
Rear Brake Pad Installation

- Push the caliper pistons in by hand as far as they will go.
- Install the outside pad [A] and insert the pad pin [B] as shown.
- Set:
  Inside Pad [C]
  Pad Spring [D]



- Pushing the pin holder [A] to hole of the pad and insert the pad pin [B].
- Tighten the pad pin.

Torque - Rear Brake Pad Pin: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)



⚠ WARNING

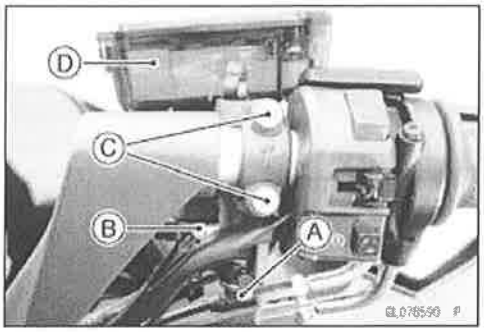
After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

Brake Pad Wear Inspection

- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

Master Cylinder

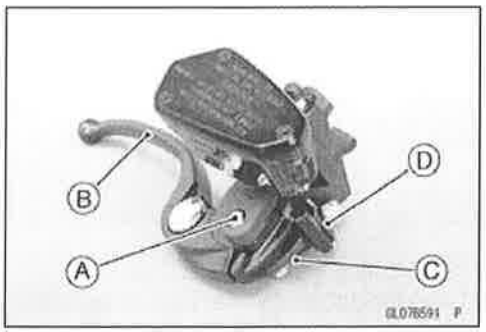
Front Master Cylinder Removal



- Remove the banjo bolt [A] to disconnect the brake hose from the master cylinder (see Brake Hose Removal/Installation).
- Disconnect the front brake light switch connectors [B].
- Remove the clamp bolts [C], and take off the master cylinder [D] as an assembly with the reservoir, brake lever, and brake switch installed.

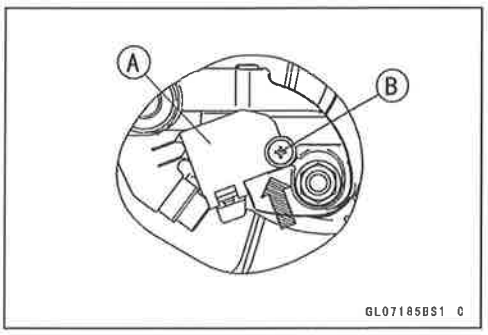
NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.



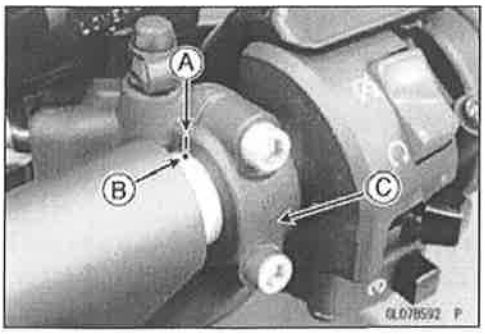
- Remove:
  Brake Lever Pivot Bolt [A] and Nut
  Brake Lever [B]
  Screw [C]
  Front Brake Light Switch [D]

Front Master Cylinder Installation



- Apply silicone grease to the brake lever pivot bolt.
- Install:
  Brake Lever
  Brake Lever Pivot Bolt
- Pushing the side of the brake light switch [A] and tighten the front brake light switch screw [B].

Torque - Brake Lever Pivot Bolt: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)
Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)
Front Brake Light Switch Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)



- Set the front master cylinder to match its mating surface [A] to the punch mark [B] of the handlebar.
- The master cylinder clamp must be installed with the arrow mark [C] upward.
- Tighten the upper clamp bolt first, and then the lower clamp bolt.

Torque - Front Master Cylinder Clamp Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

- Replace the washers that are on each side of the hose fitting with new ones.
- Tighten:

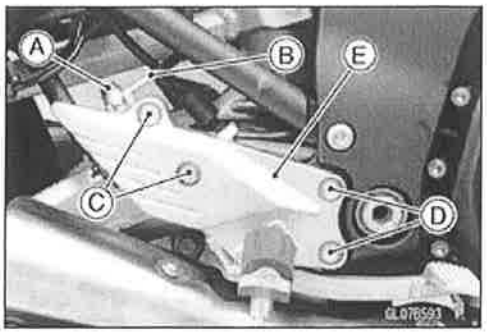
Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

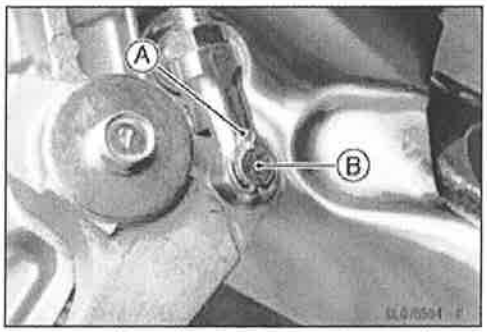
Master Cylinder

Rear Master Cylinder Removal

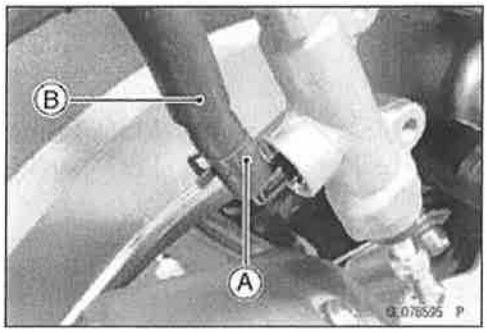
- Unscrew the brake hose banjo bolt [A] to disconnect the brake hose [B] from the rear master cylinder.
- Remove:
  Rear Master Cylinder Mounting Bolts [C]
  Right Footpeg Bracket Bolts [D]
  Right Footpeg Bracket [E]



- Remove:
  Cotter Pin [A]
  Joint Pin [B]



- Slide out the clamp [A].
- Disconnect the reservoir hose lower end [B], and drain the brake fluid into a container.



NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

Rear Master Cylinder Installation

- Replace the cotter pin with a new one.
- Install the removed parts (see appropriate chapters).
- Replace the washers that are on each side of hose fitting with new ones.
- Tighten:

Torque - Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Front Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder Assembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder

Master Cylinder Inspection (Visual Inspection)

- Remove the master cylinders (see Front/Rear Master Cylinder Removal).
- Disassemble the front and rear master cylinders (see Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter).
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].

★If a master cylinder or piston shows any damage, replace them.

- Inspect the primary cup [C] and secondary cup [D].

★If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.

★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.

- Check the dust covers [E] for damage.

★If they are damaged, replace them.

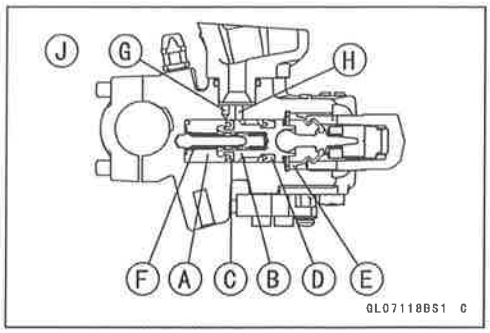
- Check the piston return spring [F] for any damage.

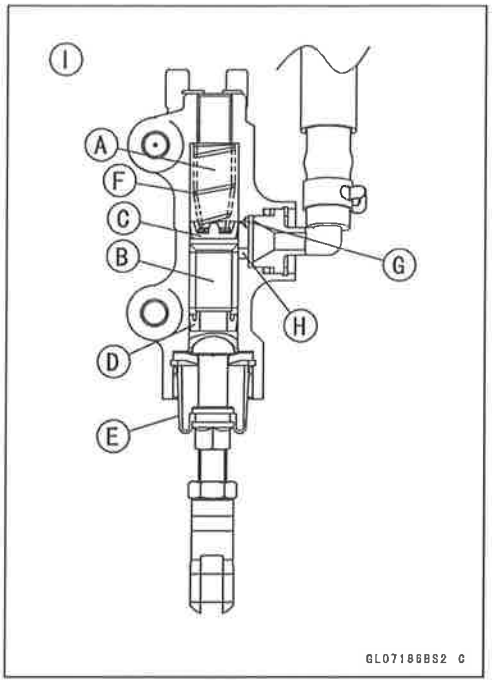
★If the springs are damaged, replace them.

- Check that relief port [G] and supply port [H] are not plugged.

★If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

Rear Master Cylinder [I]
Front Master Cylinder [J]



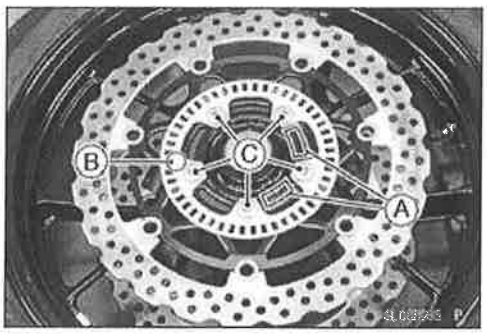


Brake Disc

Brake Disc Removal

- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Remove:
  Brake Disc Mounting Bolts
  Sensor Rotor
  Brake Disc

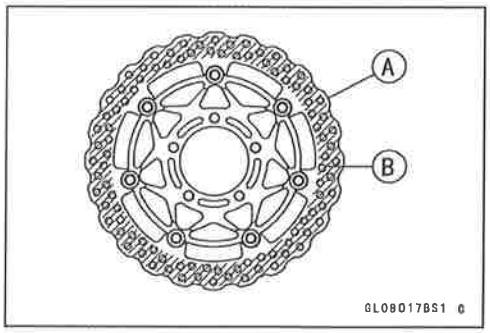
Brake Disc Installation



- Install the brake disc on the wheel so that the marked side [A] faces out.
- Install the sensor rotor on the brake disc so that the marked side [B] faces out.
- Apply a non-permanent locking agent to the threads of the brake disc mounting bolts [C].
- Tighten:

Torque - Brake Disc Mounting Bolts: 28 N·m (2.9 kgf·m, 21 ft·lb)

Brake Disc Wear Inspection



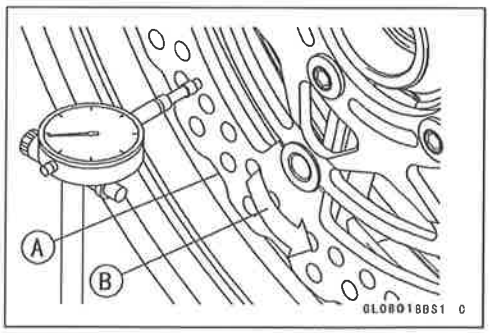
- Measure the thickness of each disc [A] at the point where it has worn the most.

★If the disc has worn past the service limit, replace it.
Measuring Area [B]

Brake Discs Thickness

Standard:	
Front	**4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)**
Rear	**5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)**
Service Limit:	
Front	**4.5 mm (0.18 in.)**
Rear	**5.0 mm (0.20 in.)**

Brake Disc Warp Inspection



- Raise the front/rear wheel off the ground.

Special Tools - Jack: 57001-1238

○For front disc inspection, turn the handlebar fully to one side.

- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.

★If runout exceeds the service limit, replace the disc.

Disc Runout

Standard:	**TIR 0.15 mm (0.0059 in.) or less**
Service Limit:	**TIR 0.3 mm (0.01 in.)**

Brake Fluid

Brake Fluid Level Inspection

- Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

Brake Fluid Change

- Refer to the Brake Fluid Change in the Periodic Maintenance chapter.

Brake Line Bleeding

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

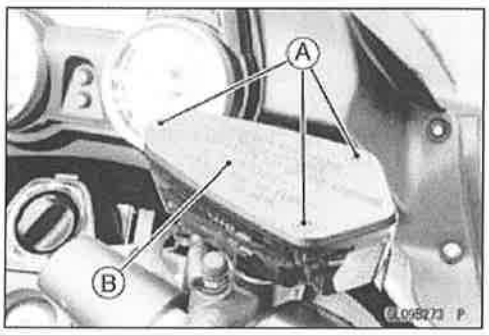
⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake lever or pedal has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTE

○*The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.*

- Remove:
  Front Brake Reservoir Cap Screws [A]
  Front Brake Reservoir Cap [B]
  Diaphragm Plate
  Diaphragm



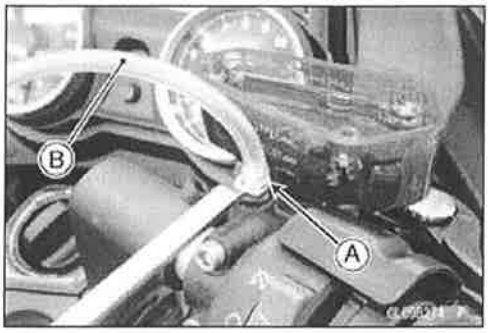
NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

- Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.

Brake Fluid

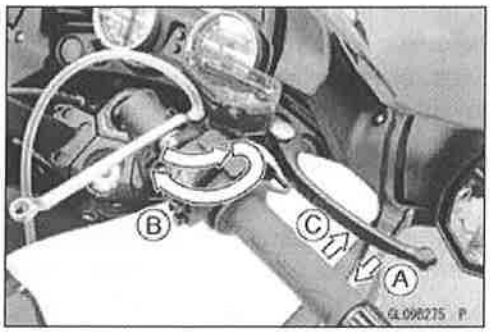
- Remove the rubber cap from the bleed valve [A] on the front master cylinder.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.



- Bleed the brake line and the master cylinder.

○Repeat this operation until no more air can be seen coming out into the plastic hose.

1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
2. Quickly open and close [B] the bleed valve while holding the brake applied.
3. Release the brake [C].



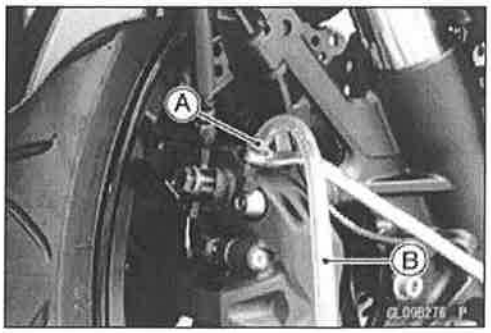
NOTE

○*The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*

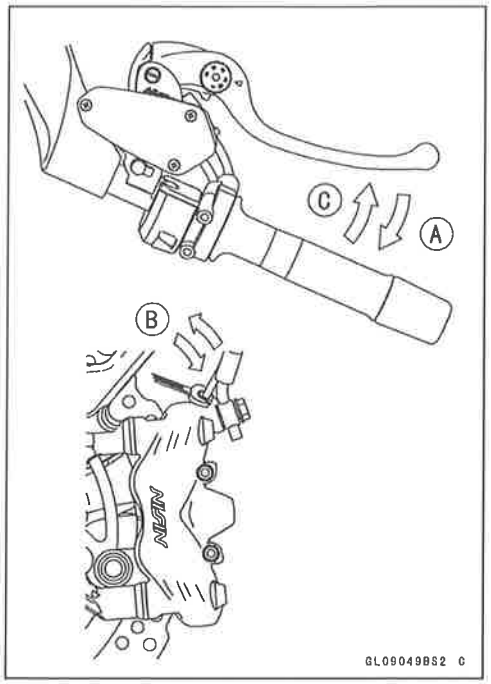
- Remove the clear plastic hose.
- Tighten the bleed valve, and install the rubber cap.

Torque - Front Master Cylinder Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- Remove the rubber cap from the bleed valve [A] on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.



Brake Fluid



- Bleed the brake line and the caliper.

○Repeat this operation until no more air can be seen coming out into the plastic hose.

1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
2. Quickly open and close [B] the bleed valve while holding the brake applied.
3. Release the brake [C].

NOTE

○*The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*

○*Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*

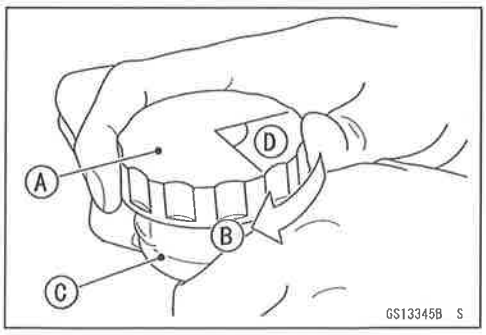
○*Front Brake: First bleeding the right caliper then repeat the above steps for the left caliper.*

- Remove the clear plastic hose.
- Tighten the bleed valve, and install the rubber cap.

Torque - Bleed Valve: 8.0 N·m (0.82 kgf·m, 71 in·lb)

- Install:
  Diaphragm
  Diaphragm Plate
  Front Brake Reservoir Cap
- Tighten:

Torque - Front Brake Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)



- Follow the procedure below to install the rear brake fluid reservoir cap correctly.

○First, tighten the brake fluid reservoir cap [A] clockwise [B] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body [C], then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body.

- Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
- After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

Brake Fluid

⚠ WARNING

When working with the disc brake, observe the precautions listed below.

- Never reuse old brake fluid.
- Do not use fluid from a container that has been left unsealed or that has been open for a long time.
- Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
- Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
- Don't change the fluid in the rain or when a strong wind is blowing.
- Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning of the brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.
- When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
- Brake fluid quickly damages painted surfaces; any spilled fluid should be completely wiped up immediately.
- If any of the brake line fittings or the bleed valve is opened at any time, the AIR MUST BE BLED FROM THE BRAKE LINE.

Brake Hose

Brake Hose and Pipe Removal/Installation

- Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter.

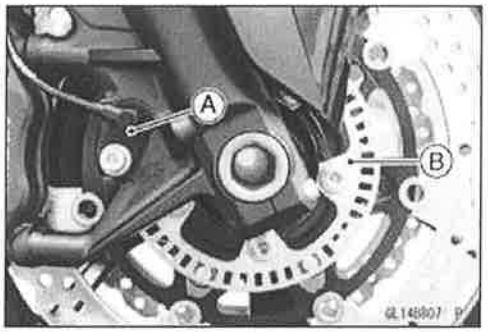
Brake Hose and Pipe Inspection

- Refer to the Brake System Inspection in the Periodic Maintenance chapter.

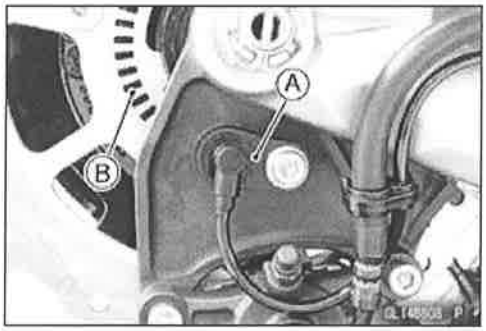
K-ACT ABS

Parts Location

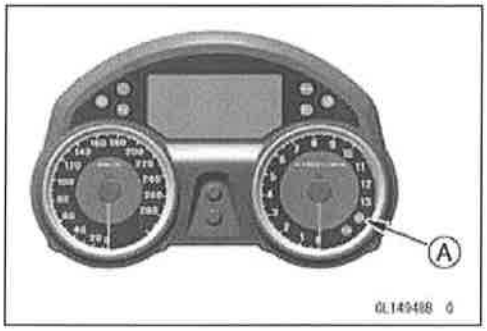
Front Wheel Rotation Sensor [A]
Front Wheel Rotation Sensor Rotor [B]



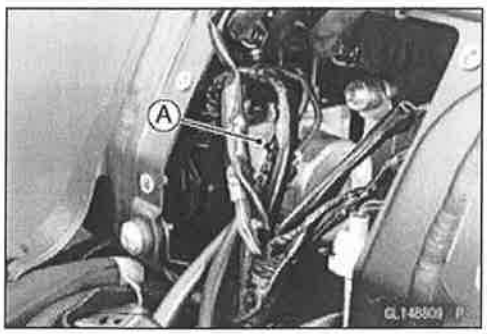
Rear Wheel Rotation Sensor [A]
Rear Wheel Rotation Sensor Rotor [B]



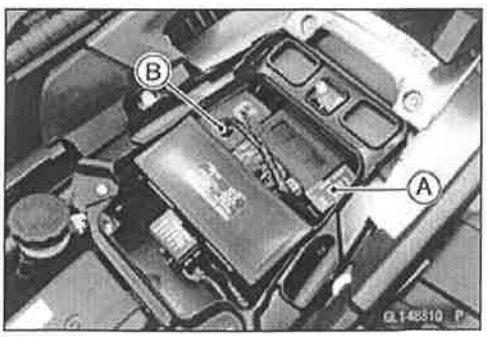
Yellow K-ACT ABS Indicator Light (LED) [A]



K-ACT ABS Hydraulic Unit [A]

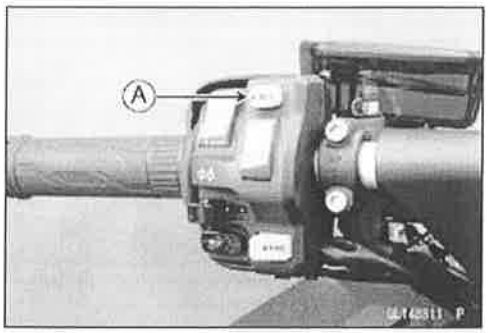


Fuse Box 2 [A]
K-ACT ABS Kawasaki Diagnostic System Connector [B]



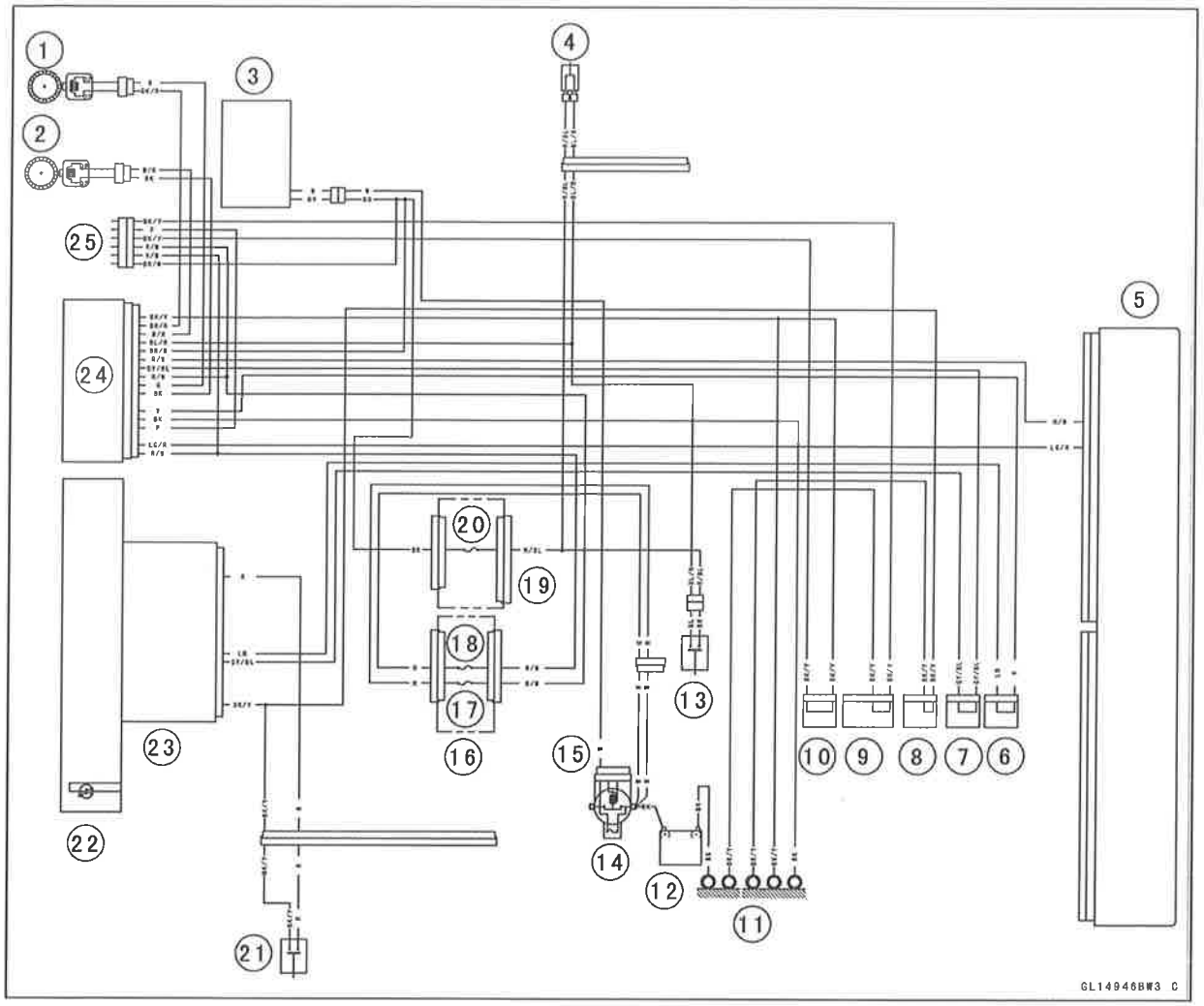
K-ACT ABS

K-ACT ABS Button [A]



K-ACT ABS

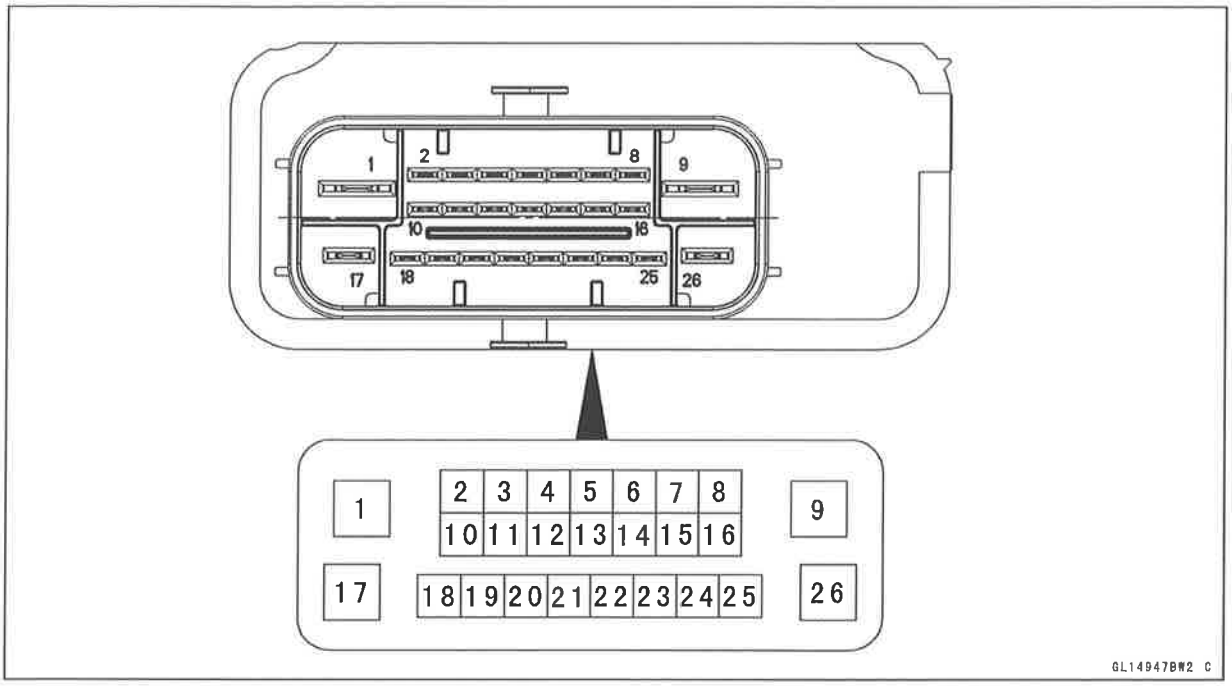
K-ACT ABS System Circuit



1. Front Wheel Rotation Sensor
2. Rear Wheel Rotation Sensor
3. Steering Lock Unit
4. Front Brake Light Switch
5. ECU
6. Joint Connector 4
7. Joint Connector 5
8. Joint Connector 8
9. Joint Connector 9
10. Joint Connector 11
11. Frame Ground
12. Battery 12 V 14 Ah
13. Rear Brake Light Switch
14. Main Fuse 30 A
15. Starter Relay
16. Fuse Box 2
17. K-ACT ABS Solenoid Valve Relay Fuse 20 A
18. K-ACT ABS Motor Relay Fuse 30 A
19. Fuse Box 1
20. Taillight Fuse 10 A
21. K-ACT ABS Button
22. Yellow K-ACT ABS Indicator Light (LED)
23. Meter Unit
24. K-ACT ABS Hydraulic Unit
25. K-ACT ABS Kawasaki Diagnostic System Connector

K-ACT ABS

Terminal Names



1. Power Supply to K-ACT ABS Motor Relay: R/W
2. Rear Wheel Rotation Sensor Output: LG/R
3. Unused
4. Unused
5. Unused
6. K-ACT ABS Kawasaki Diagnostic System Terminal: P
7. Unused
8. Unused
9. Ground to Motor: BK
10. CAN Communication Line (Low): V
11. Unused
12. Unused
13. Unused
14. Rear Wheel Rotation Sensor Signal: BK
15. Power Supply to Front Wheel Rotation Sensor: G
16. Unused
17. Power Supply to K-ACT ABS Solenoid Valve Relay: R/W
18. CAN Communication Line (High): GY/BL
19. Front Wheel Rotation Sensor Output: R/W
20. Power Supply: BR/W
21. Unused
22. Front and Rear Brake Light Switch: BL/R
23. Power Supply to Rear Wheel Rotation Sensor: W/R
24. Front Wheel Rotation Sensor Signal: BK/R
25. Unused
26. Ground to ECU: BK/Y

K-ACT ABS

K-ACT ABS Servicing Precautions

There are a number of important precautions that should be followed servicing the K-ACT ABS.

- K-ACT ABS does not function if the battery is discharged. When driving with an insufficiently charged battery, K-ACT ABS may not function. Keep the battery in good condition.
- This K-ACT ABS is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the K-ACT ABS hydraulic unit.
- To prevent damage to the K-ACT ABS parts, do not disconnect the battery cables or any other electrical connections when the key knob is ON or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Do not turn the key knob ON while any of the K-ACT ABS electrical connectors are disconnected. The K-ACT ABS hydraulic unit memorizes service codes.
- Do not spray water on the electrical parts, K-ACT ABS parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the K-ACT ABS is not influenced by electric wave radiated from the antenna. Locate the antenna as far as possible away from the K-ACT ABS hydraulic unit.
- Whenever the K-ACT ABS electrical connections are to be disconnected, first turn off the key knob.
- The K-ACT ABS parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- The K-ACT ABS parts cannot be disassembled. Even if a fault is found, do not try to disassemble and repair the K-ACT ABS parts, replace it.
- The K-ACT ABS has many brake lines, pipes, and leads. And the K-ACT ABS cannot detect problems with the conventional braking system (brake disc wear, unevenly worn brake pad, and other mechanical faults). To prevent trouble, check the brake lines and pipes for correct routing and connection, the wiring for correct routing, and the brakes for proper braking power. Be sure to check for fluid leakage, and bleed the brake line thoroughly.

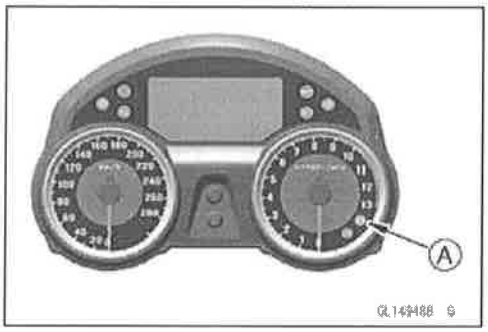
K-ACT ABS

⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If any of the brake line fittings, including the K-ACT ABS hydraulic unit joint nuts, or the bleed valve is opened at any time, the air must be bled completely from the brake line. If the brake lever has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTICE

Do not ride the motorcycle with air in the brake line, or the K-ACT ABS could malfunction.



OThe yellow K-ACT ABS indicator light (LED) [A] may light if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light lights, remedy the problem and clear the service code.

⚠ WARNING

Use of non-recommended tires may cause malfunctioning of K-ACT ABS and can lead to extended braking distance. The rider could have an accident as a result. Always use recommended standard tires for this motorcycle.

OThe yellow K-ACT ABS indicator light (LED) may come on if the engine is run with the motorcycle on its stand and the transmission in gear. If the indicator light comes on, just turn the steering lock unit to OFF, then clear service code "B 42" which indicates a "Faulty front wheel rotation sensor."

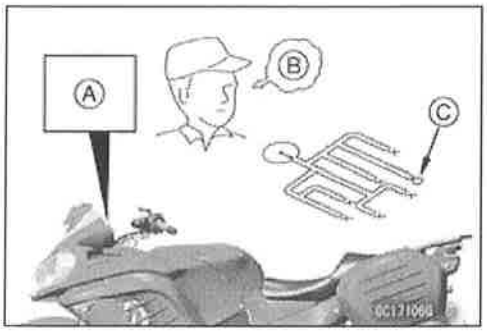
OWhen the K-ACT ABS operates, the K-ACT ABS makes noise and the rider feels the reaction force on the brake lever and brake pedal. This is a normal condition. It informs the rider that the K-ACT ABS is operating normally.

OService codes detected once by the K-ACT ABS hydraulic unit will be memorized in the K-ACT ABS hydraulic unit. Therefore, after maintenance work is finished, be sure to erase the service codes. Do not erase the service codes during troubleshooting. Wait until all the checks and repair work are finished to prevent duplication of previous service codes and unnecessary maintenance work.

K-ACT ABS

○Before delivering the motorcycle to the customer, be sure to erase any service codes which might be stored in the K-ACT ABS hydraulic unit. A fully charged battery is a must for conducting reliable self-diagnosis. Test run the motorcycle at a speed of more than 20 km/h (12 mph) to see that the yellow K-ACT ABS indicator light (LED) does not come on. Finally, test run the motorcycle at a speed of more than 30 km/h (20 mph) and brake suddenly to see that the motorcycle stops without loss of steering control and the K-ACT ABS operates normally (The reaction force generated is felt in the brake lever and pedal.). This completes the final inspection.

K-ACT ABS Troubleshooting Outline



When an abnormality in the system occurs, the yellow K-ACT ABS indicator light (LED) lights up and the warning message and warning symbol are displayed alternately on the LCD (Liquid Crystal Display) to alert the rider. In addition, the nature of the fault is stored in the memory of the K-ACT ABS hydraulic unit and when in the self-diagnosis mode, the service code [A] is displayed on the LCD by the "B" and the number of two digits. The service codes stored in memory are not erased until the mode has been changed to the fault erase mode after the fault has been corrected. Therefore, after correcting the problem, always erase the service codes and then run the self-diagnosis program to confirm normal signal output. When, due to a malfunction, the yellow K-ACT ABS indicator light (LED) remains lit, get a thorough understanding of the background before starting the repair work. Ask the rider about the conditions [B] under which the problem occurred and try to determine the cause [C]. Do not rely solely on the K-ACT ABS self-diagnosis function, use common sense; check the brakes for proper braking power, and brake fluid level, search for leaks, etc.

Even when the K-ACT ABS is operating normally, the yellow K-ACT ABS indicator light (LED) may light up under the conditions listed below. Turn the key knob OFF to stop the indicator light. If the motorcycle runs without erasing the service code, the light may light up again.

○After continuous riding on a rough road.
○When the engine is started with the stand raised and the transmission engaged, and the rear wheel turns.
○When accelerating so abruptly that the front wheel leaves the ground.
○When the K-ACT ABS has been subjected to strong electrical interference.
○When tire pressure is abnormal. Adjust tire pressure.
○When a tire different in size from the standard size is being used. Replace with standard size.
○When the wheel is deformed. Replace the wheel.

K-ACT ABS

Much of the K-ACT ABS troubleshooting work consists of confirming continuity of the wiring. The K-ACT ABS parts are assembled and adjusted by the manufacturer, so there is no need to disassemble or repair them. Replace the K -ACT ABS hydraulic unit.

The basic troubleshooting procedures are listed below.

- Carry out pre-diagnosis inspections as a preliminary inspection.
- Determine the fault using the self-diagnosis function.
- Check wiring and connections from the K-ACT ABS hydraulic unit connector to the suspected faulty K-ACT ABS part, using a tester.

- Visually inspect the wiring for signs of burning or fraying.

★If any wiring is poor, replace the damaged wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt and damage.

★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

- Check the wiring for continuity.

○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

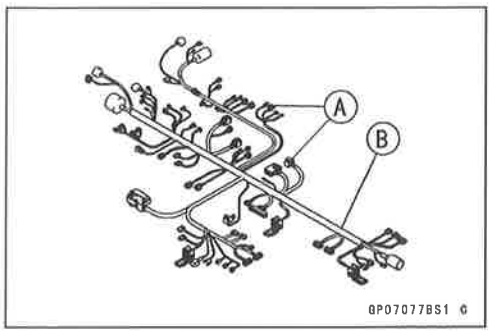
○Connect the tester between the ends of the leads.

★If the tester does not read about 0 Ω, the lead is defective. Replace the main harness [B] if necessary.

- Narrow down suspicious parts and close in on the faulty K-ACT ABS part by repeating the continuity tests.

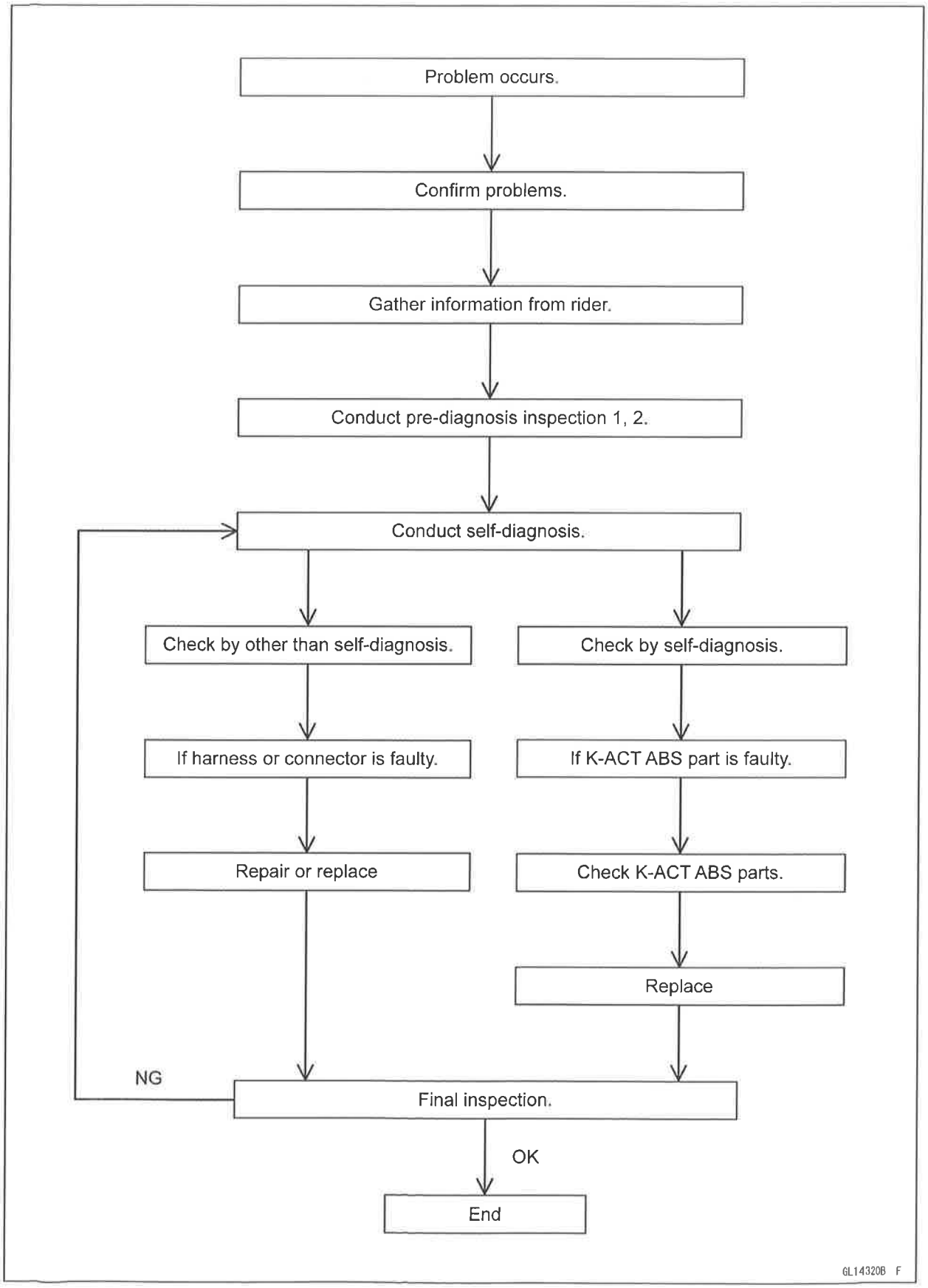
★If no abnormality is found in the wiring or connectors, the K-ACT ABS parts are the next likely suspects. Check each part one by one.

★If an abnormality is found, replace the affected K-ACT ABS part.



K-ACT ABS

K-ACT ABS Diagnosis Flow Chart



Inquiries to Rider

- Each rider reacts to problems in different ways, so it is important to confirm what kind of problem the rider is experiencing.
- Try to find out exactly what problem occurs under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem in the workshop.
- The diagnosis sheet will help prevent you from overlooking any key information, so always use it.

Sample Diagnosis Sheet 1

Rider Name: ..... Registration No. (license plate No.): .....
Date of registration: ..... Model: .....
Vin No.: ..... Odometer reading: ..... km or miles
Engine No.: ..... Odometer reading when problem first occured: ..... km or miles

Question	Description			Answer	Advice to customer
Which statement/s best describes the fault with the ABS system?	*Yellow ABS indicator light (LED) illuminated?*	*Flashing*			A fault has been detected with the ABS system.
		Continuous			
		Not working			
	ABS not working				Further inspection by technician required.
	ABS operates too frequently				Continuous riding on rough or un-even surfaces can cause the ABS to operate more frequently.
	Stopping distance too long				
	Does the wheel lock when you apply the brakes				Further inspection by technician required.
	Brake can't be released				
	Other				
Do the front and rear brake levers feel normal during application?	*Normal*				Further inspection by technician required.
	Abnormal	*Long stroke (lever feels soft and moves back close to the handle bar)*			This indicates a probable fault with the braking system and should be inspected immediately.
		Limited stroke (lever feels hard and has little movement)			
		Pulsing/vibrating			
	Which lever? (front, rear or both)				
When does the fault occur?	*During start up / stationary*	*(Is a centre stand or service stand used)*			If the motorcycle engine is left running whilst on its centre or service stand, mechanical drag can cause the rear wheel to rotate. If the rear wheel rotates the ABS system may detect a fault. Turning off the ignition switch and restarting should reset the yellow ABS indicator light (LED) if no problems are detected. However the service code will be stored in the ABS ECU and should be reset by the dealer.
	Driving below 6 km/h (4mph) (Speeds vary depending on model)				The ABS system is not active at these speeds.
	Driving above 6 km/h (4mph) (Speeds vary depending on model)				This may be normal ABS operation if the road conditions are poor.
	When slowing or stopping (Rate of brake application)	*Gradual braking*	*front only*		
			rear only		
			both brakes		
		During abrupt braking	*front only*		Abrupt braking may cause the ABS to function early as the suspension may not have had enough time to react to the situation.
			rear only		
			both brakes		
		There is no specific pattern			
	Other				

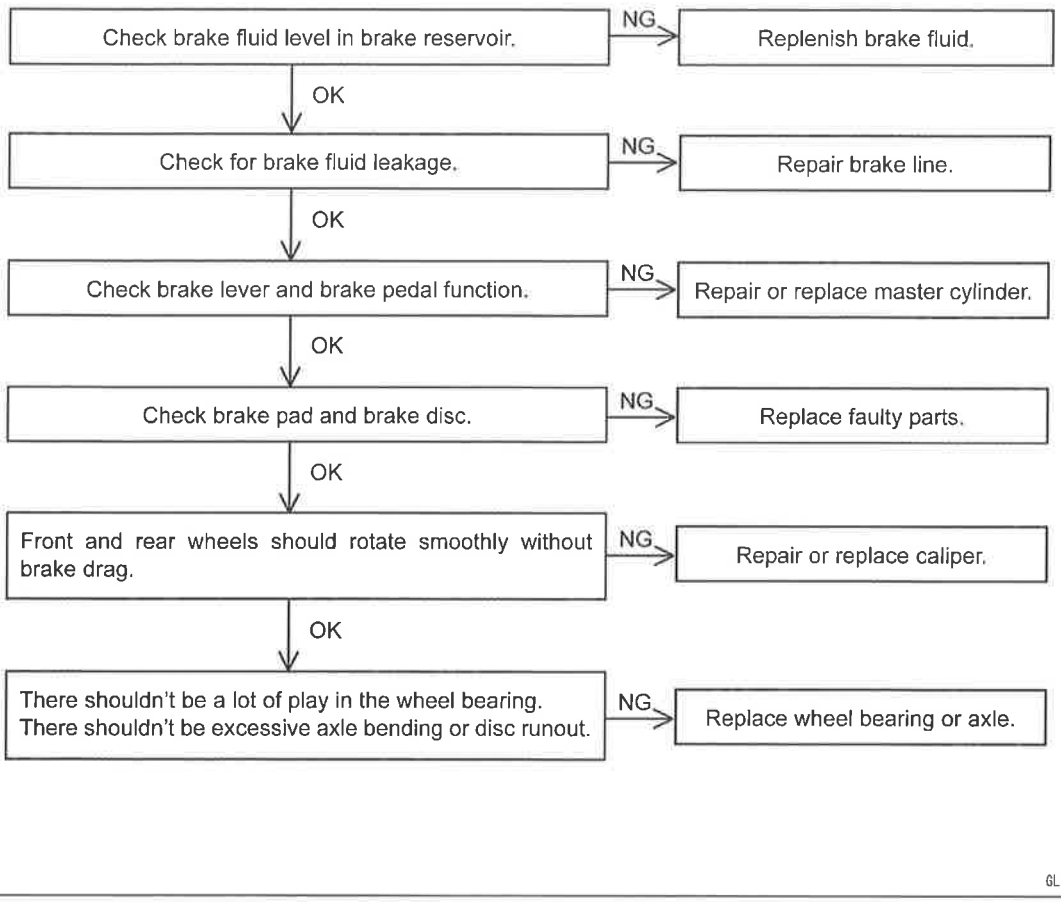
Question	Description		Answer	Advice to customer
How often does the fault occur?	*Every time ignition is switched on*			Further inspection by technician required.
	Every time the brakes are used (Continually)			
	No regularity (Intermittent)			
	Other			
During which riding conditions does the fault occur?	*Highway riding*	*Any comment on riding style maybe applicable.*		Braking and handling characteristics can vary with vehicle speed, therefore ABS operation during braking at highway speed may be more frequent.
	City riding			Accelerating abruptly between traffic signals so that the front wheel leaves the ground can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.
	Minor/country roads riding			Continuous riding on rough or uneven surfaces can cause the ABS to operate more frequently.
	Cross country riding			Continuous riding on loose or off road surfaces can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.
	Track/closed circuit riding			Excessive use of the ABS system due to continuous fast riding can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.
	All			Further inspection by technician required.
In what road conditions does the problem occur?	*Dry*			Further inspection by technician required.
	Wet			In wet conditions it is possible that the ABS is operating normally
	Snow/Ice			In snow/icy conditions it is possible that the ABS is operating normally
	Loose/rough surface (gravel)			On loose/rough surfaces it is possible that the ABS is operating normally
Motorcycle condition	*Has the machine been regularly serviced according to the periodic maintenance schedule?*			If the service history is incomplete it is possible that a fault may become apparent. For example, failure to replace the brake fluid during periodic maintenance can cause the hydraulic unit to become internally damaged.
	Have there been any previous braking problems?			Any previous braking problems may be related to the ABS complaint. It is important that the customer provides as much information as possible so that diagnosis can be made as quickly as possible.
	Have any aftermarket parts been fitted?	*OE Tires and brakes?*		Further inspection by technician required.
	Have the daily safety checks been carried out? (tire pressures / condition etc.)			Worn tires or tires with incorrect pressures can cause an ABS fault. It is important to regularly check both tire condition and pressure.

Dealer Findings

Sample Diagnosis Sheet 2

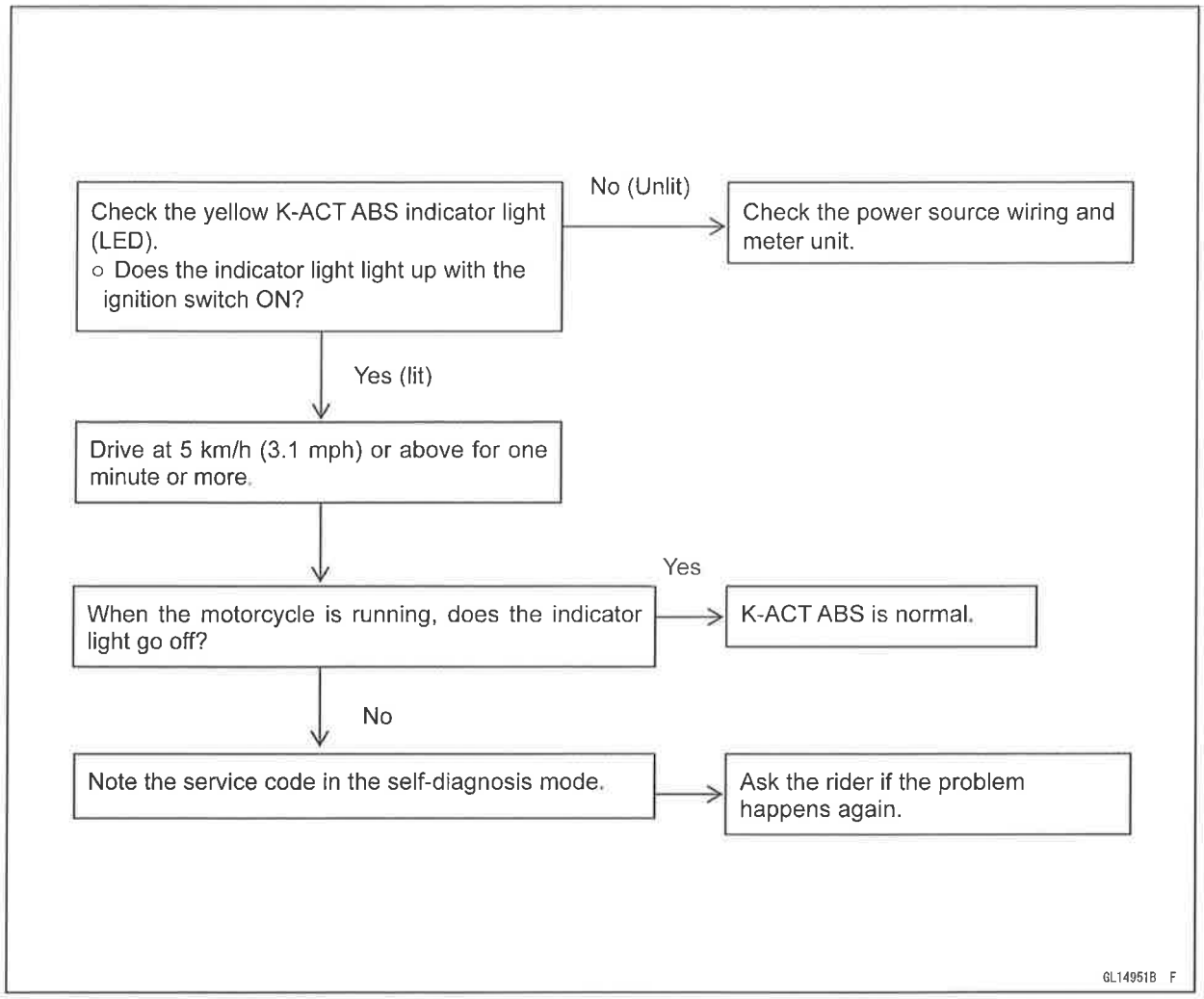
Question/Action	Description		Answer	Advice to technician
Review customer feedback information	*Carefully analyze the information that has been collected from the customer. Use this information to help you perform your initial diagnosis.*			
Check to see if any diagnostic codes are present	*1*			If codes are present refer to service manual.
	2			
	3			
	4			
	5			
Inspect the following	*Battery voltage*			The ABS is designed to be used with a 12 V sealed battery as its power source. Only use the battery specified by the service manual as a power source. If low battery voltage is detected service codes: B52 or B53 will be displayed.
	Tires type/size		Front ..... Rear	Refer to service manual.
	Tire pressures		Front ..... Rear	
	Tire condition		Front ..... Rear	Excessive or abnormal wear can be recognized as an ABS fault.
	Wheel rotation sensor air gap		Front ..... Rear	Refer to service manual. Also check that the wheel orientation is correct.
	Wheel condition (damaged or deformed)		Front ..... Rear	Refer to service manual.
	Brake system general condition		Front ..... Rear	Pad wear/Front and rear operation/Condition of hoses etc.
	Brake disc run-out		Front ..... Rear	Refer to service manual.
Additional information on the yellow ABS indicator light (LED)	*Continuous*	*Stays on all the time while ignition on*		Check for diagnostic trouble codes.
		Turns off when first moving off but turns on again and stays on		
		Turns on when brake(s) are operated		
		Other:		
	Not working	*Turns off soon after moving off*		Test the operation of the light by turning on the ignition. If the light fails to illuminate ensure that the bike is equipped with ABS before inspecting the meter panel for faults as per the service manual.
		Turns off after riding for a while		
		Other:		
	How many times does it flash per 10 seconds?		5, 15, or 20	By flashing the ABS unit is indicating additional fault codes that may not be listed in the service manual. Please carefully count the number of flashes per 10 seconds before contacting Kawasaki. *(Kawasaki may request a video of the flashing sequence)*
			Other: ..... times	

Pre-Diagnosis Inspection 1



K-ACT ABS

Pre-Diagnosis Inspection 2


Check the yellow K-ACT ABS indicator light (LED).
o Does the indicator light light up with the ignition switch ON?
No (Unlit)
Check the power source wiring and meter unit.
Yes (lit)
Drive at 5 km/h (3.1 mph) or above for one minute or more.
When the motorcycle is running, does the indicator light go off?
Yes
K-ACT ABS is normal.
No
Note the service code in the self-diagnosis mode.
Ask the rider if the problem happens again.
GL14951B F

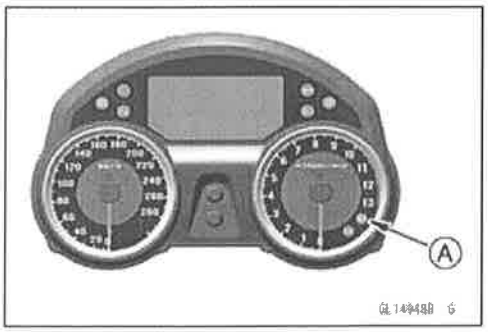
Self-diagnosis Outline

Refer to the Self-Diagnosis System chapter for the self-diagnosis or service code.

Yellow K-ACT ABS Indicator Light (LED) Inspection

OIn this model, the yellow K-ACT ABS indicator light (LED) [A] goes on or blinks by the data sent from the K-ACT ABS hydraulic unit.

- Refer to the Meter Operation Inspection in the Electrical System chapter.

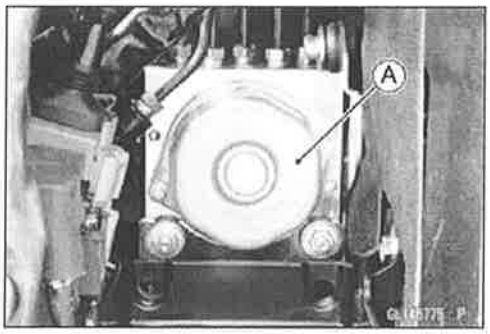


K-ACT ABS

K-ACT ABS Hydraulic Unit Removal

NOTICE

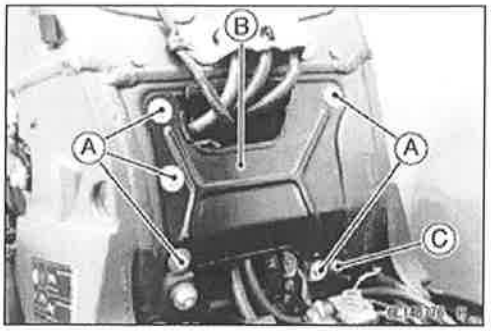
The K-ACT ABS hydraulic unit [A] has been adjusted and set with precision at the factory. Therefore, it should be handled carefully, never struck sharply with a hammer, or allowed to fall on a hard surface.
Be careful not to get water or mud on the K-ACT ABS hydraulic unit.



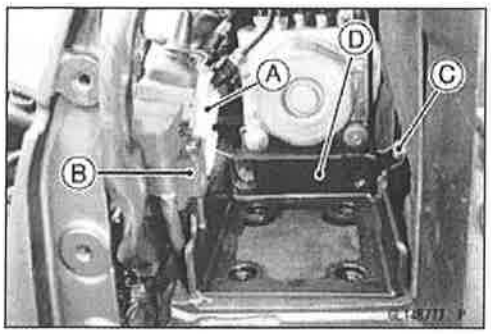
- Drain the brake fluid from the front and rear brake lines.

○Drain the brake fluid through the bleed valve by pumping the brake lever and pedal.

- Remove:
  Battery (see Battery Removal in the Electrical System chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Battery Back Cover Bolts [A]
  Battery Back Cover [B]
  Battery Case Holder Bolt [C]



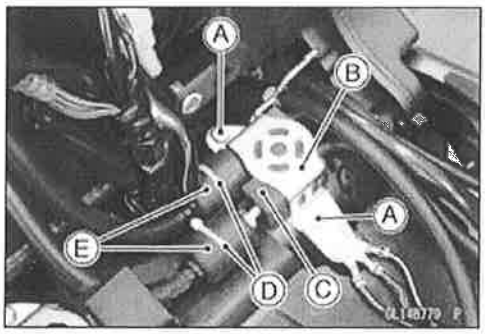
- Remove:
  Connector [A]
  Starter Relay Assembly [B]
  Battery Case Holder Bolt [C] with Washer
  Battery Case Holder [D]



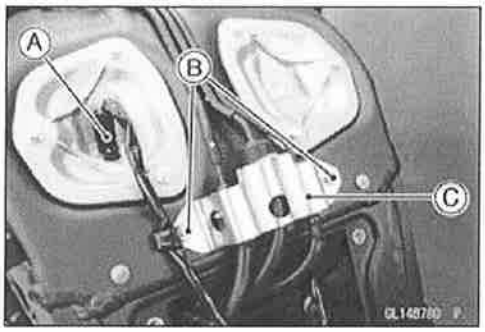
- Remove:
  K-ACT ABS Hydraulic Unit Bracket Bolts [A]

K-ACT ABS

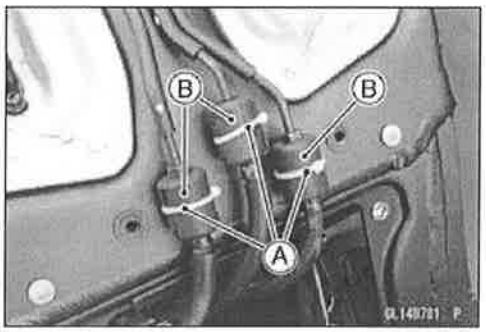
- Remove:
  Bracket Bolts [A]
  Bracket [B]
  Damper [C]
- Cut the bands [D] and remove the grommets [E].



- Remove:
  Intake Air Temperature Sensor Connector [A]
  Brake Pipe Bracket Bolts [B]
  Bracket [C]



- Cut the bands [A] and remove the grommets [B].



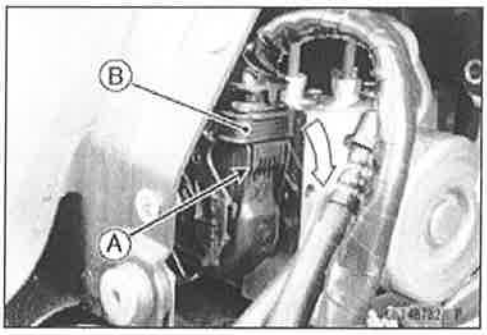
- Clean the K-ACT ABS hydraulic unit.

NOTICE
Clean all fittings on the K-ACT ABS hydraulic unit and the rear master cylinder because dirt around the banjo bolts could contaminate the brake fluid in the line during removal/installation. **Spread out a shop towel around the K-ACT ABS hydraulic unit before removing the brake line so that brake fluid does not leak on the parts.**

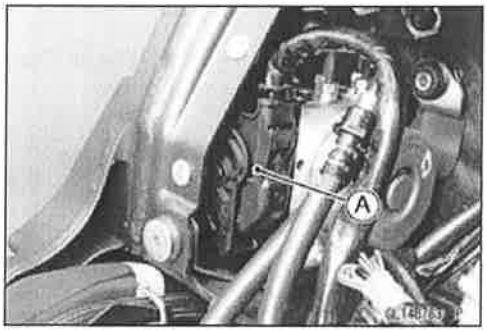
NOTE

○*Remove the brake hoses and pipes according to each assembly of the exploded view.*

- Push the stopper [A] and pull the lever [B] until it is stopped.



- Disconnect the K-ACT ABS hydraulic unit lead connector [A].



- Loosen the brake pipe joint nuts [A] and disconnect the brake hoses [B].

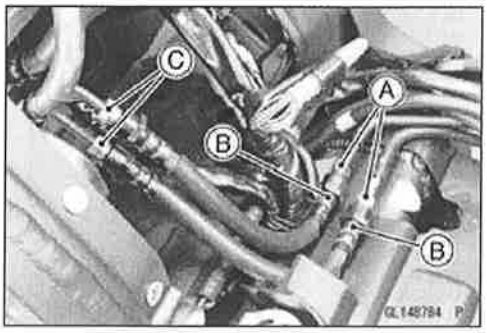
NOTE

○*Do not loosen the brake pipe joint nuts [C].*

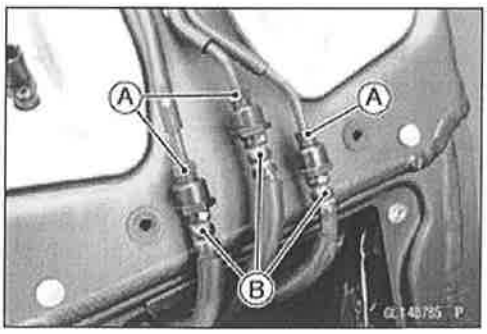
- Tape the brake line opening to prevent brake fluid leakage or contamination by foreign matter.

NOTICE

Brake fluid quickly ruins painted plastic surfaces; any spilled fluid should be completely washed away immediately.

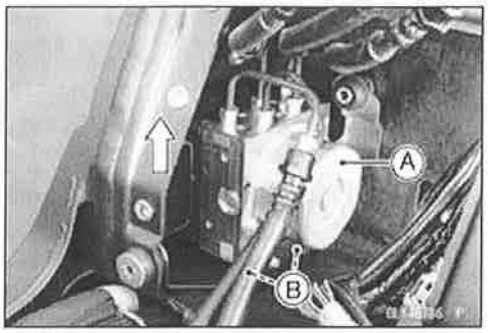


- Loosen the brake pipe joint nuts [A] and disconnect the brake hoses [B].



K-ACT ABS

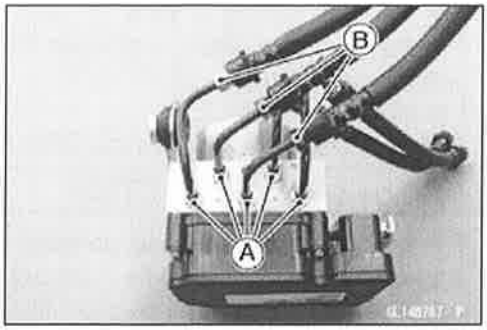
- Pull the K-ACT ABS hydraulic unit [A] upward to clear the projections [B].



- Loosen the brake pipe joint nuts [A] and remove the brake pipes.

NOTE

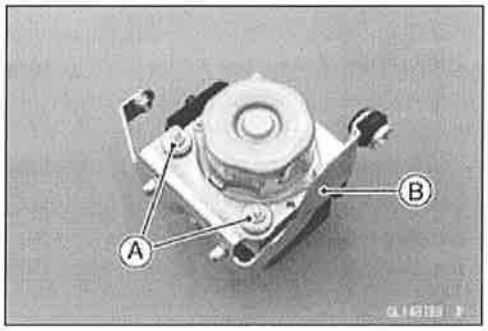
○*Do not loosen the brake pipe joint nut [B].*



- Remove:
  K-ACT ABS Hydraulic Unit Nuts [A]
  Bracket [B]

NOTICE

The K-ACT ABS hydraulic unit has been adjusted and set with precision at the factory. Do not try to disassemble and repair the K-ACT ABS hydraulic unit.



K-ACT ABS

K-ACT ABS Hydraulic Unit Installation

- Install the bracket to the K-ACT ABS hydraulic unit.
- Tighten:

Torque - K-ACT ABS Hydraulic Unit Nuts: 7.0 N·m (0.7 kgf·m, 62 in·lb)

- Before installing the brake pipe, check to see that there is no damage on the threads of the brake pipe joint nut.

★If there is any damage, replace the damaged parts with new ones.

- When installing the hoses and pipes, avoid sharp bending, kinking, flatting or twisting, and route the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- Install:

Brake Hoses and Brake Pipe Joint Nuts

NOTICE

Brake fluid quickly ruins painted plastic surfaces; any spilled fluid should be completely washed away immediately.

NOTE

○*Tighten the brake hose joint pipe nuts at both ends of the brake pipe temporarily and then tighten them to the specified torque.*

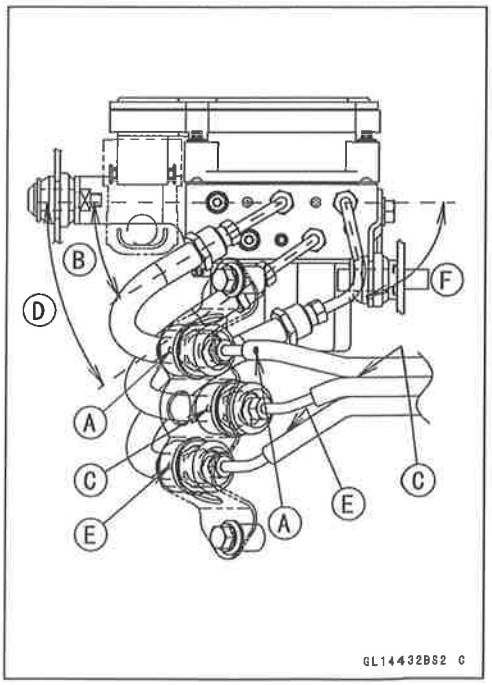
○*Tighten the brake pipe joint nuts with the flare nut wrench.*

- Install the brake pipe assemblies correctly as shown.

[A] Yellow Marks
[B] 31°
[C] White Marks
[D] 35°
[E] Blue Marks
[F] 77°

- Tighten:

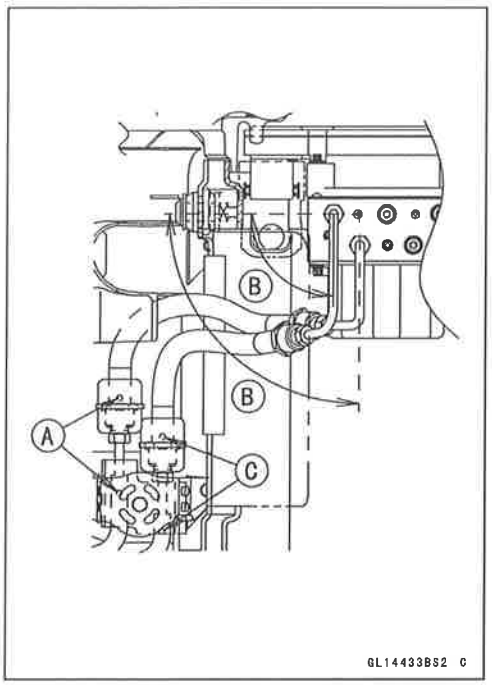
Torque - Brake Pipe Joint Nuts: 18 N·m (1.8 kgf·m, 13 ft·lb)



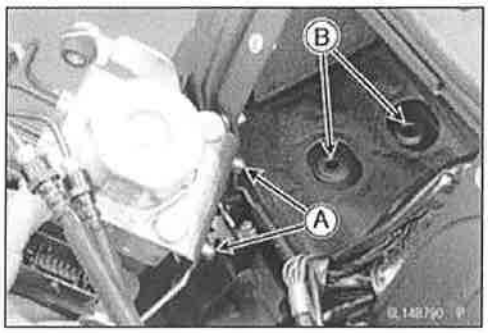
K-ACT ABS

- Install the brake pipe assemblies correctly as shown in the figure.
  [A] Green Marks
  [B] 90°
  [C] Purple Marks
- Tighten:

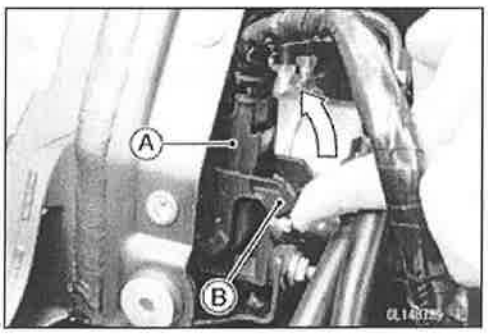
Torque - Brake Pipe Joint Nuts: 18 N·m (1.8 kgf·m, 13 ft·lb)



- Insert the projections [A] into the grommets [B].

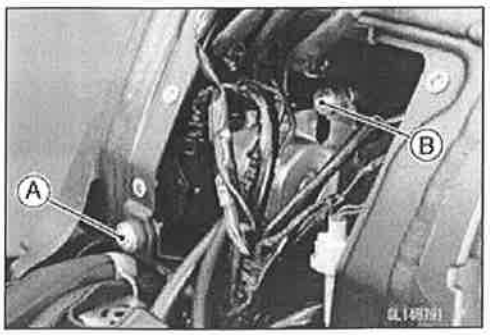


- Connect the lead connector [A] and push the lever [B] until it is locked.



- Tighten:

Torque - K-ACT ABS Hydraulic Unit Bracket Bolt (L = 30 mm) [A]: 7.0 N·m (0.7 kgf·m, 62 in·lb)
K-ACT ABS Hydraulic Unit Bracket Bolt (L = 35 mm) [B]: 7.0 N·m (0.7 kgf·m, 62 in·lb)



- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.
- Install the removed parts (see appropriate chapters).

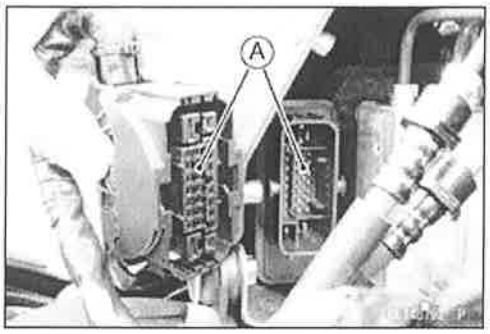
K-ACT ABS

K-ACT ABS Hydraulic Unit Inspection

- Visually inspect the connector terminals [A].

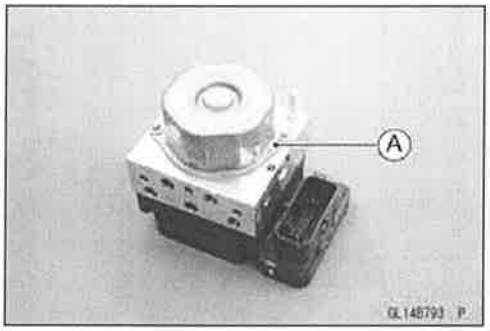
★ Replace the K-ACT ABS hydraulic unit or main harness if either of the terminals are cracked, bent, or otherwise damaged.

★ If the K-ACT ABS hydraulic unit connector is clogged with mud or dust, blow it off with compressed air.



- Remove the K-ACT ABS hydraulic unit [A] (see K-ACT ABS Hydraulic Unit Removal).
- Visually inspect the K-ACT ABS hydraulic unit.

★ Replace the K-ACT ABS hydraulic unit if any of them are cracked, or otherwise damaged.

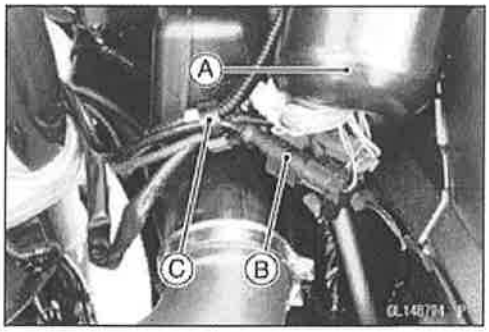


Front Wheel Rotation Sensor Removal

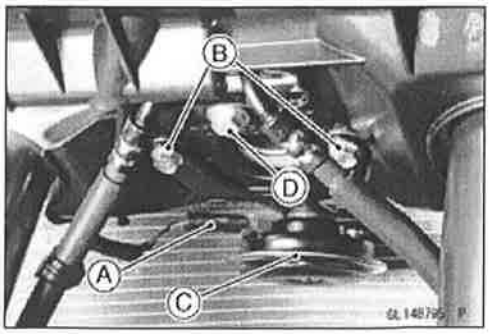
NOTICE

The wheel rotation sensor should be handled carefully, never struck sharply with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor.
Do not try to disassemble or repair the wheel rotation sensor.

- Remove:
  Right Inner Cover (see Inner Cover Removal in the Frame chapter)
  Upper Inner Fairing (see Upper Inner Fairing in the Frame chapter)
- Slide the dust cover [A].
- Disconnect the connector [B] and free the front wheel rotation sensor lead from the clamp [C].

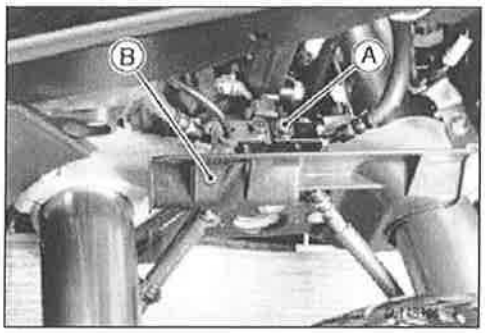


- Disconnect:
  Horn Lead Connectors [A]
- Remove:
  Horn Bolts [B]
  Horn [C]
  Steering Stem Cover Bolts [D]

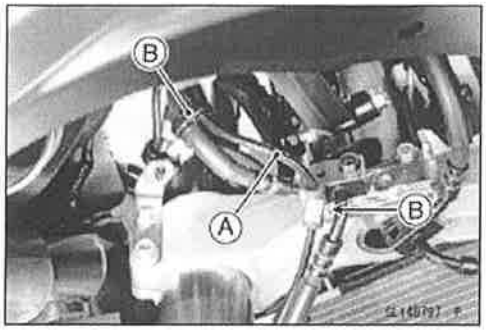


K-ACT ABS

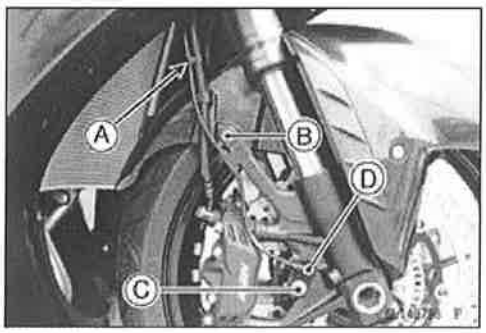
- Remove:
  Brake Hose Bolt [A]
  Steering Stem Cover [B]



- Free the front wheel rotation sensor lead [A] from the clamps [B].



- Free the front wheel rotation sensor lead from the clamps [A].
- Remove:
  Bolt [B]
  Front Wheel Rotation Sensor Bolt [C]
  Front Wheel Rotation Sensor [D]



Front Wheel Rotation Sensor Installation

- Installation is the reverse of removal.

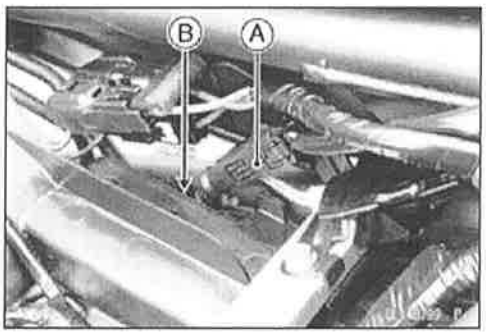
○Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Torque - Front Wheel Rotation Sensor Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

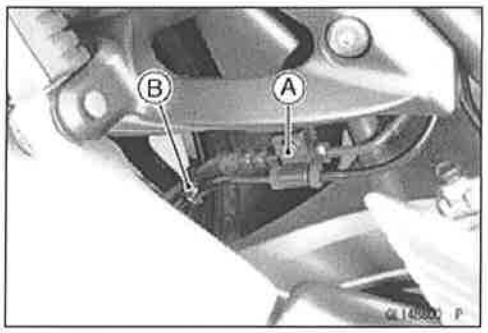
Rear Wheel Rotation Sensor Removal

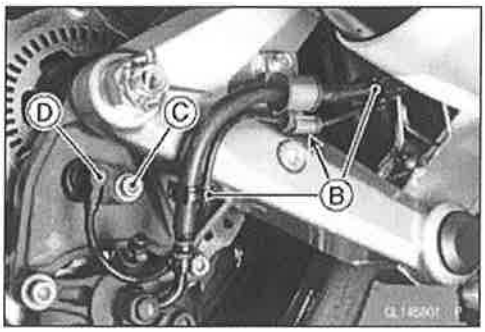
NOTICE
The wheel rotation sensor should be handled carefully, never struck sharply with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor. **Do not try to disassemble or repair the wheel rotation sensor.**

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect the rear wheel rotation sensor lead connector [A].
- Remove the rear wheel rotation sensor lead connector from the bracket.
- Free the rear wheel rotation sensor lead from the guide [B].



- Remove:
  Bracket Bolts [A]
  Clamps [B]
  Rear Wheel Rotation Sensor Bolt [C]
  Rear Wheel Rotation Sensor [D]





Rear Wheel Rotation Sensor Installation

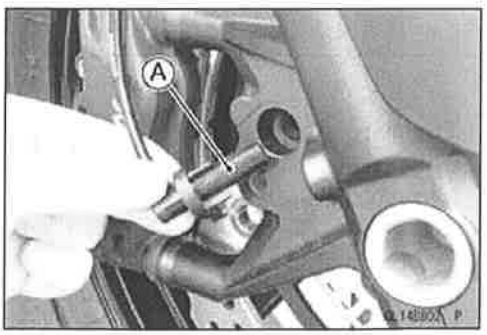
- Installation is the reverse of removal.

○Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Torque - Rear Wheel Rotation Sensor Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

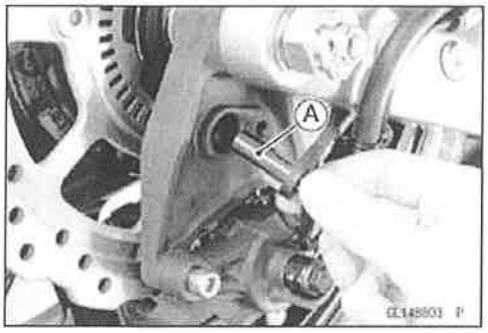
Wheel Rotation Sensor Inspection

- Remove the front wheel rotation sensor [A] from the sensor bracket.



K-ACT ABS

- Remove the rear wheel rotation sensor [A] from the caliper bracket.



- Visually inspect the wheel rotation sensors.

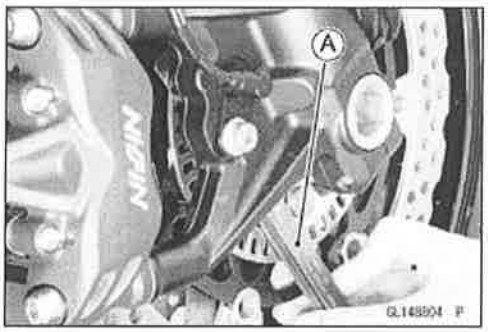
★Replace the wheel rotation sensor if it is cracked, bent, or otherwise damaged.

Wheel Rotation Sensor Air Gap Inspection

- Raise the front/rear wheel off the ground (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Measure the air gap between the sensor and sensor rotor at several points by turning the wheel slowly.
  Thickness Gauge [A]

Air Gap
Standard:

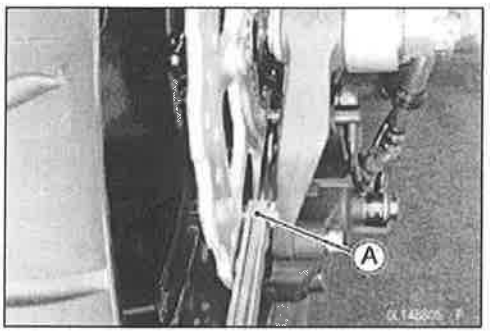
Front	**0.4 ~ 1.6 mm (0.015 ~ 0.063 in.)**
Rear	**0.4 ~ 1.6 mm (0.015 ~ 0.063 in.)**



NOTE

○ *The sensor air gap cannot be adjusted.*

★If the air gap is not within the specification, inspect the hub bearing (see Hub Bearing Inspection in the Wheels/Tires chapter), sensor installation condition and sensor (see Wheel Rotation Sensor Inspection).



Wheel Rotation Sensor Rotor Removal

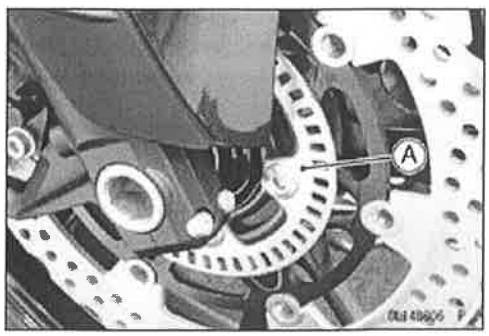
- Refer to the Brake Disc Removal for the wheel rotation sensor removal.

Wheel Rotation Sensor Rotor Installation

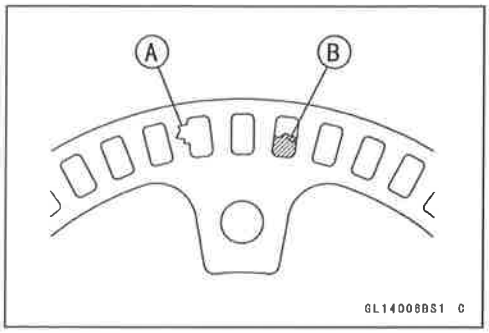
- Refer to the Brake Disc Installation for the wheel rotation sensor rotor installation.

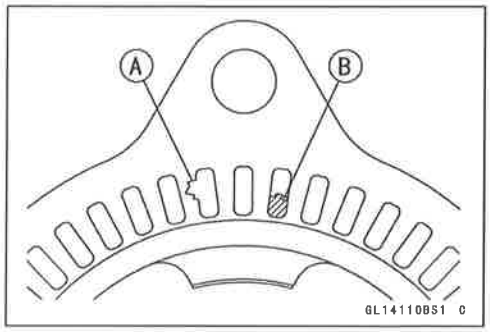
Wheel Rotation Sensor Rotor Inspection

- Turn the wheels, and visually inspect the wheel rotation sensor rotor [A].



★If the rotor is deformed or damaged (chipped teeth [A]), replace the sensor rotor with a new one.
★If there is iron or other magnetic deposits [B], remove the deposits.





K-ACT ABS Solenoid Valve Relay Fuse (20 A) Removal

- Refer to the Fuse Box Fuse Removal in the Electrical System chapter.

K-ACT ABS Motor Relay Fuse (30 A) Removal

- Refer to the Fuse Box Fuse Removal in the Electrical System chapter.

Fuse Installation

★If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage (see Fuse Installation in the Electrical System chapter).

Fuse Inspection

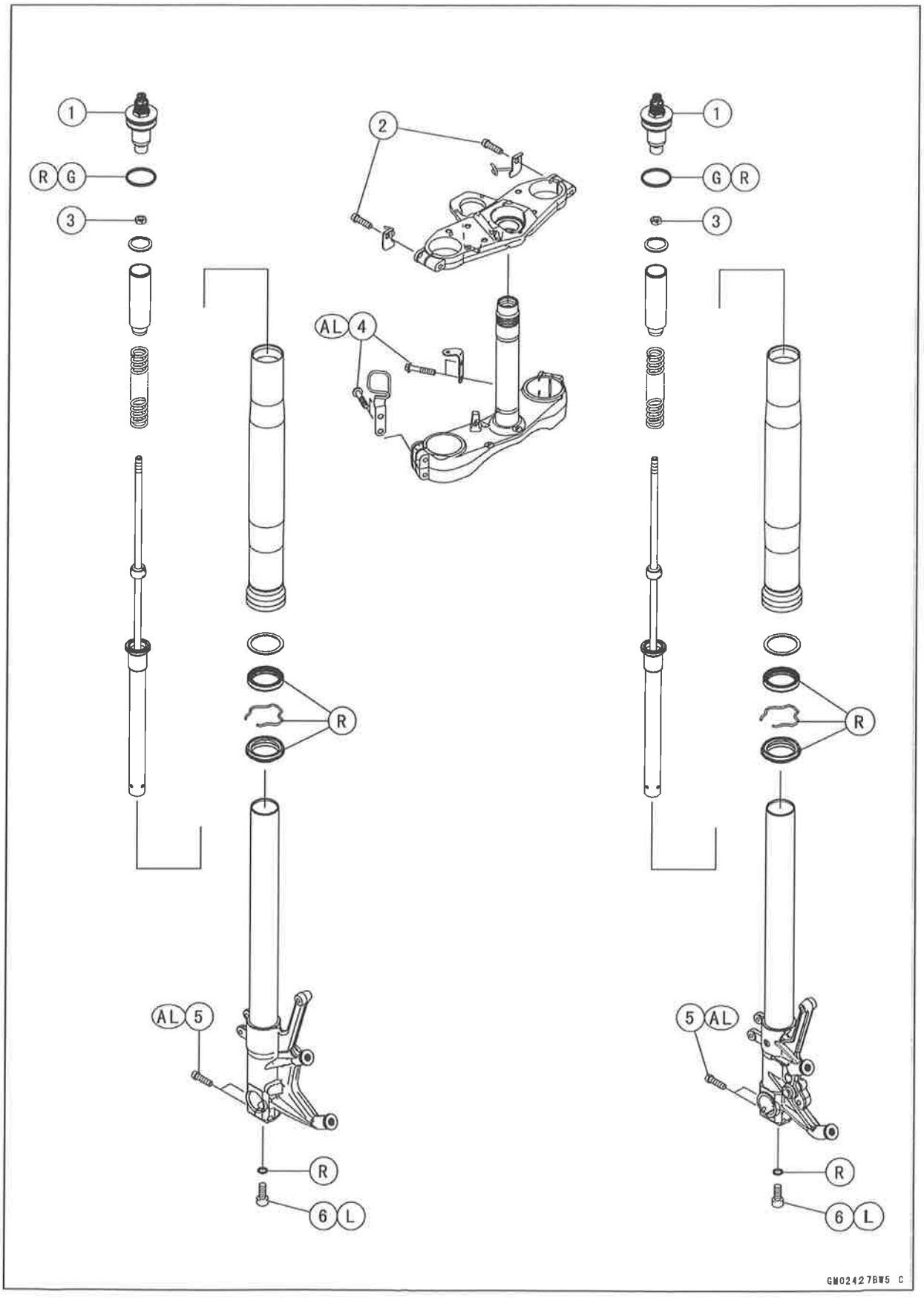
- Remove the fuses (see K-ACT ABS Solenoid Valve Relay Fuse (20 A)/K-ACT ABS Motor Relay Fuse (30 A) Removal).
- Refer to the Fuse Inspection in the Electrical System chapter.

Suspension

Table of Contents

Exploded View 13-2
Specifications 13-6
Special Tools 13-7
Front Fork 13-10
  Rebound Damping Force Adjustment 13-10
  Spring Preload Adjustment 13-10
  Front Fork Removal (Each Fork Leg) 13-11
  Front Fork Installation 13-11
  Front Fork Oil Change 13-11
  Front Fork Disassembly 13-22
  Front Fork Assembly 13-22
  Inner Tube Inspection 13-23
  Dust Seal Inspection 13-24
  Spring Tension 13-24
Rear Shock Absorber 13-25
  Rebound Damping Force Adjustment 13-25
  Spring Preload Adjustment 13-25
  Rear Shock Absorber Removal 13-25
  Rear Shock Absorber Installation 13-27
  Rear Shock Absorber Inspection 13-27
  Rear Shock Absorber Scrapping 13-27
Swingarm 13-28
  Swingarm Removal 13-28
  Swingarm Installation 13-29
  Swingarm Bearing Removal 13-30
  Swingarm Bearing Installation 13-31
  Swingarm Bearing, Sleeve Inspection 13-32
  Swingarm Bearing Lubrication 13-32
  Torque Rod Removal 13-32
  Torque Rod Installation 13-33
  Torque Rod Bearing Removal 13-33
  Torque Rod Bearing Installation 13-34
Tie-Rod, Rocker Arm 13-35
  Tie-Rod Removal 13-35
  Tie-Rod Installation 13-35
  Rocker Arm Removal 13-35
  Rocker Arm Installation 13-35
  Tie-Rod and Rocker Arm Bearing Removal 13-36
  Tie-Rod and Rocker Arm Bearing Installation 13-36
  Rocker Arm/Tie-Rod Bearing, Sleeve Inspection 13-38
  Rocker Arm/Tie-Rod Bearing Lubrication 13-38

Exploded View

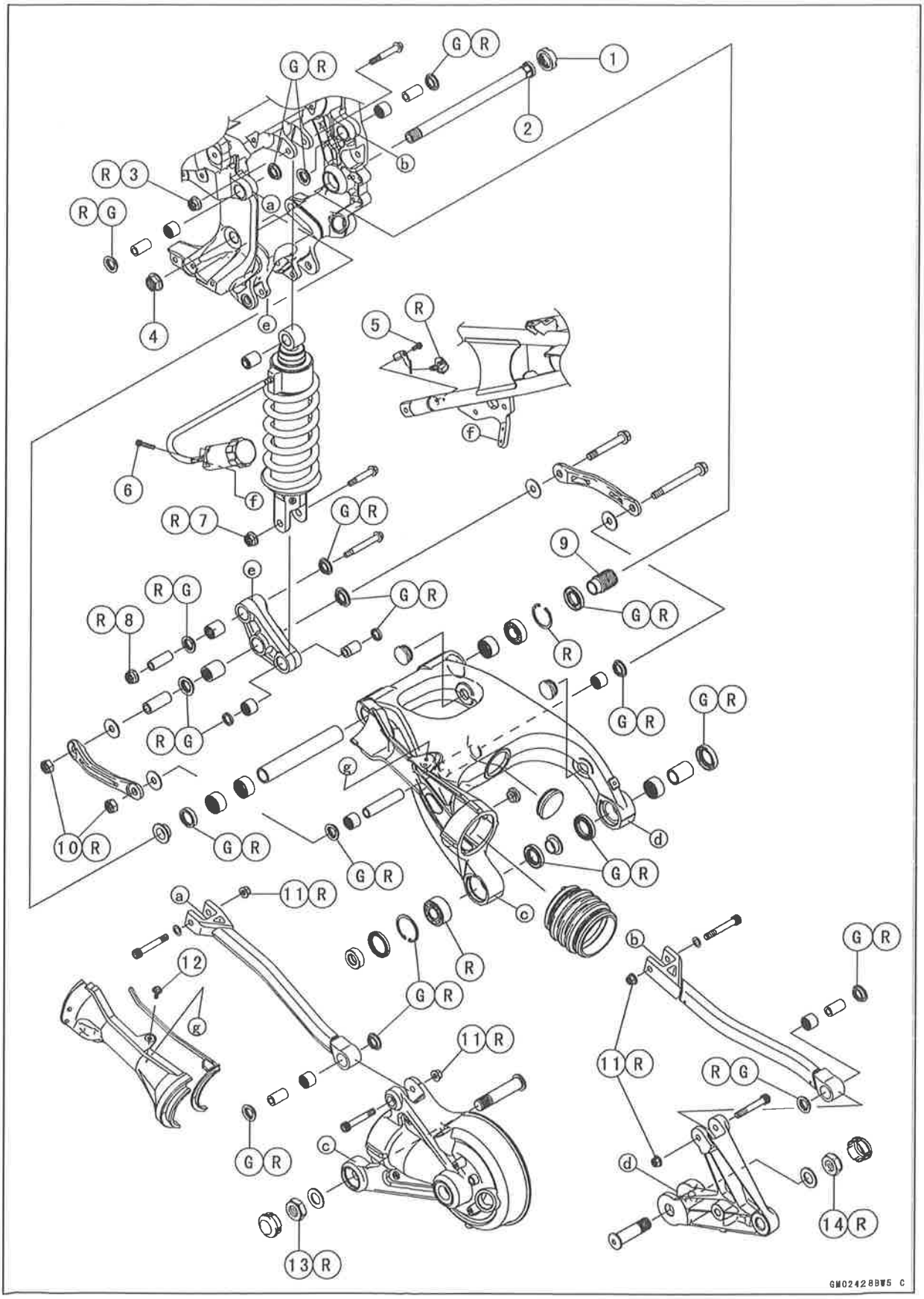


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fork Top Plugs	23	2.3	17	
2	Front Fork Clamp Bolts (Upper)	20	2.0	15	
3	Piston Rod Nuts	15	1.5	11	
4	Front Fork Clamp Bolts (Lower)	30	3.1	22	AL
5	Front Axle Clamp Bolts	20	2.0	15	AL
6	Front Fork Bottom Allen Bolts	23	2.3	17	L

AL: Tighten the two clamp bolts alternately two time to ensure even tightening torque.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Swingarm Pivot Adjusting Collar Locknut	100	10.2	73.8	
2	Swingarm Pivot Shaft	20	2.0	15	
3	Rear Shock Absorber Nut (Upper)	45	4.6	33	R
4	Swingarm Pivot Shaft Nut	110	11.2	81.1	
5	Spring Preload Adjuster Cable Bracket Bolt	8.0	0.82	71 in·lb	
6	Spring Preload Adjuster Bolts	8.0	0.82	71 in·lb	
7	Rear Shock Absorber Nut (Lower)	35	3.6	26	R
8	Rocker Arm Nut	50	5.1	37	R
9	Swingarm Pivot Adjusting Collar	20	2.0	15	
10	Tie-Rod Nuts	60	6.1	44	R
11	Torque Rod Nuts	60	6.1	44	R
12	Swingarm Cover Bolt	4.0	0.41	35 in·lb	
13	Final Gear Case Locknut	100	10.2	73.8	R
14	Axle Bracket Locknut	100	10.2	73.8	R

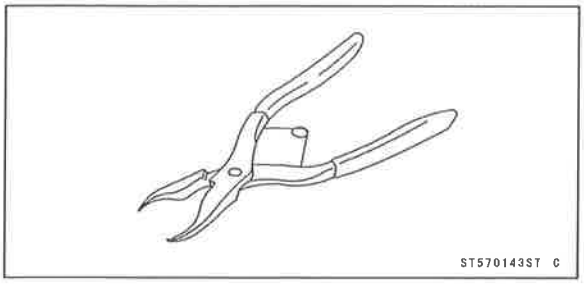
G: Apply grease.
R: Replacement Parts

Specifications

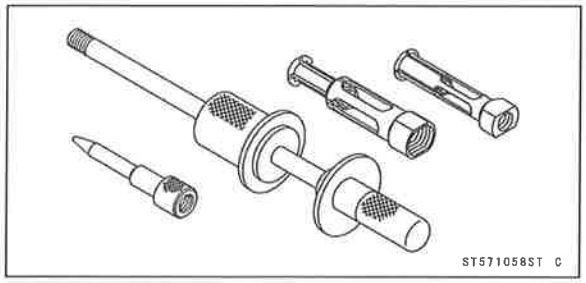
Item	Standard
Front Fork (Per One Unit)	
Fork Inner Tube Diameter	ϕ43 mm (1.7 in.)
Air Pressure	Atmospheric pressure (non-adjustable)
Rebound Damper Setting	5 clicks from the fully clockwise position (Usable Range: 0 ←→ 11 clicks)
Fork Spring Preload Setting	Adjuster protrusion is 14 mm (0.55 in.) (Usable Range: 4 ~ 19 mm) (0.16 ~ 0.75 in.)
Suspension Oil:	Kawasaki KHL15-10 or equivalent
Amount:	
When Changing Oil	Approx. 470 mL (15.9 US oz.)
After Disassembly and Completely Dry	551 ±4 mL (18.6 ±0.135 US oz.)
Fork Oil Level	93 ±2 mm (3.7 ±0.08 in.) (fully compressed, without spring, below top of outer tube)
Fork Spring Free Length	244 mm (9.61 in.) [Service Limit: 240 mm (9.45 in.)]
Rear Shock Absorber	
Rebound Damper Set	1 1/4 turns out from the fully clockwise position (Usable Range: 0 ←→ 2 2/4 turns out)
Spring Preload Setting	10 clicks from the fully counterclockwise position (Usable Range: 0 ←→ 24 clicks)
Gas Pressure	1 270 kPa (12.95 kgf/cm^2, 184.1 psi, non-adjustable)

Special Tools

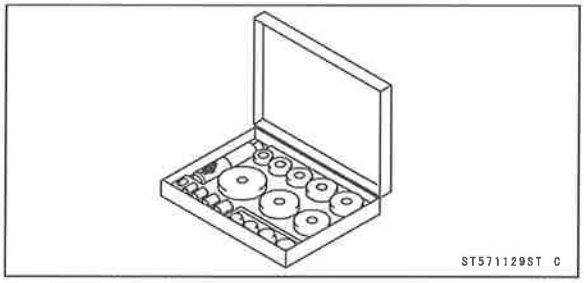
Inside Circlip Pliers:
57001-143



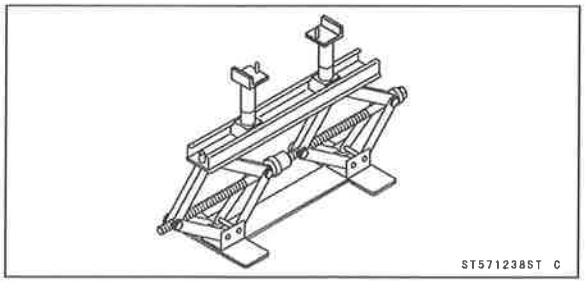
Oil Seal & Bearing Remover:
57001-1058



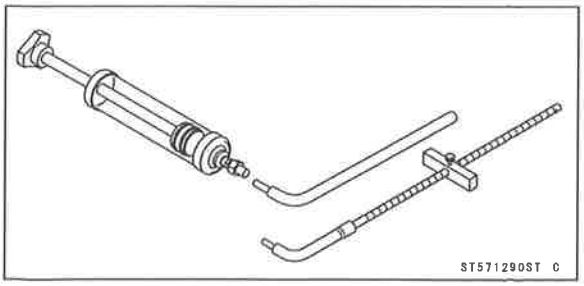
Bearing Driver Set:
57001-1129



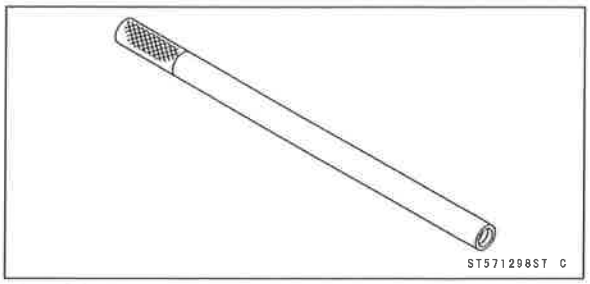
Jack:
57001-1238



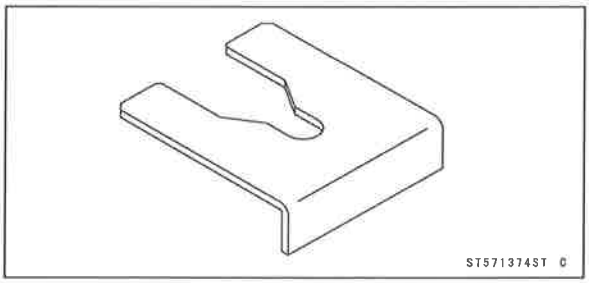
Fork Oil Level Gauge:
57001-1290



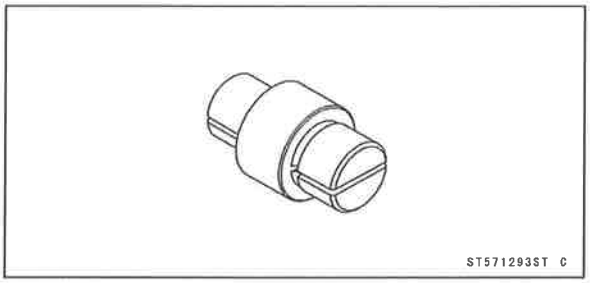
Fork Piston Rod Puller, M10 × 1.0:
57001-1298



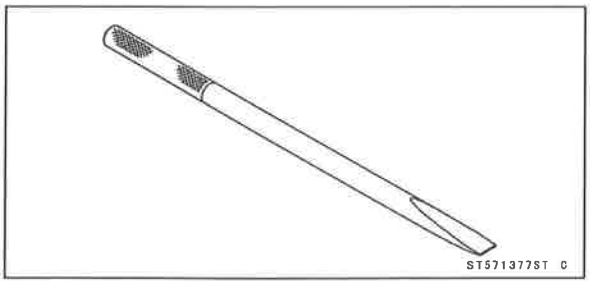
Fork Spring Stopper:
57001-1374



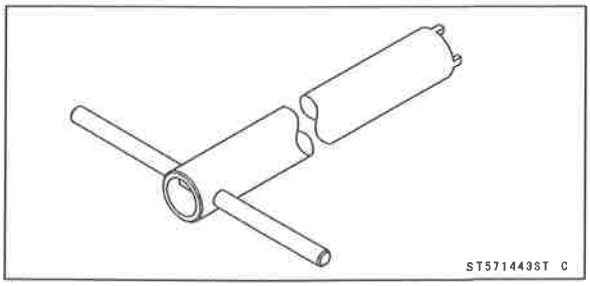
Bearing Remover Head, ϕ20 × ϕ22:
57001-1293



Bearing Remover Shaft, ϕ13:
57001-1377

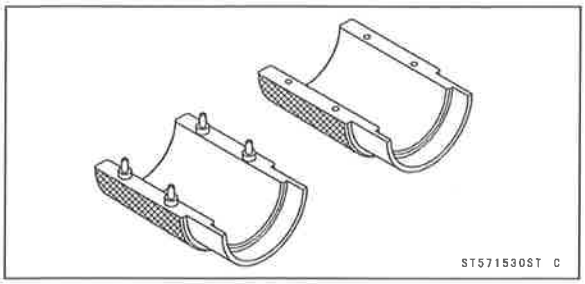


Fork Cylinder Holder:
57001-1443

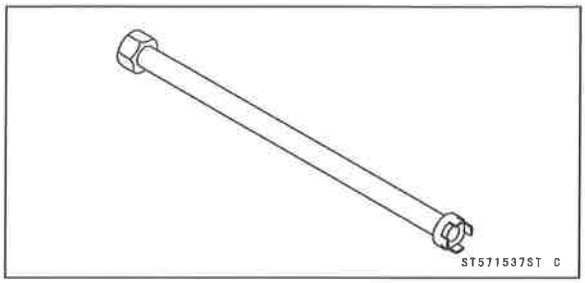


Special Tools

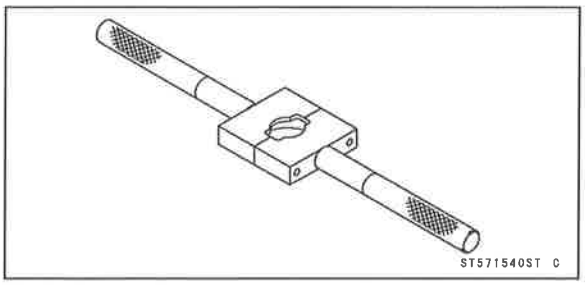
Fork Oil Seal Driver, ϕ43:
57001-1530



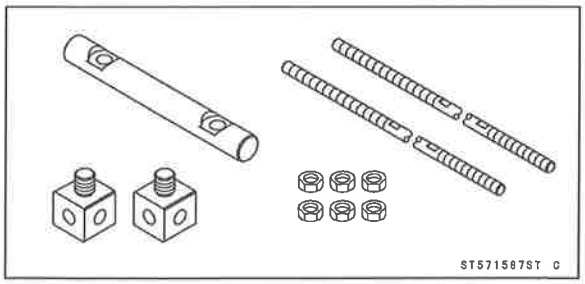
Fork Cylinder Holder, Hex 24:
57001-1537



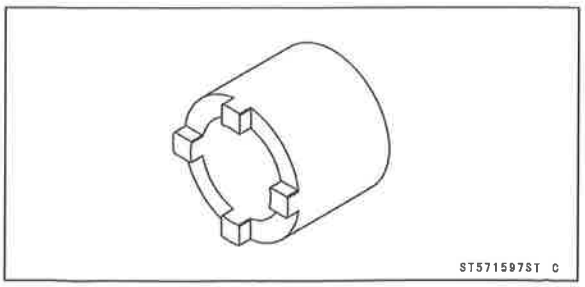
Fork Spring Compressor:
57001-1540



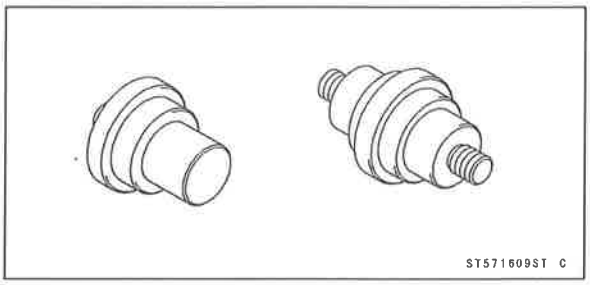
Fork Spring Compressor:
57001-1587



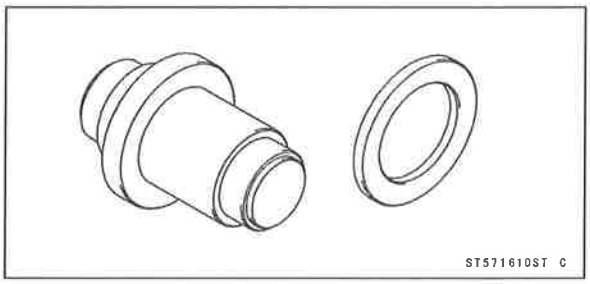
Swingarm Pivot Nut Wrench:
57001-1597



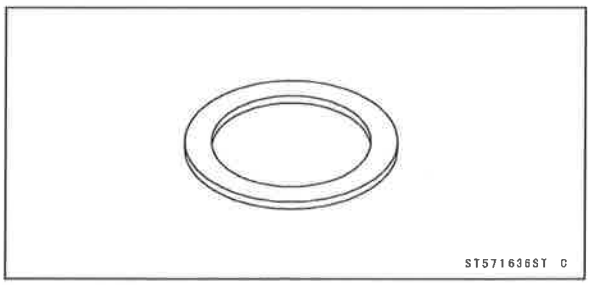
Needle Bearing Driver, ϕ17/ϕ18:
57001-1609



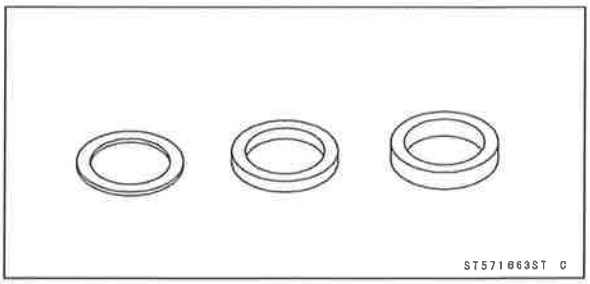
Needle Bearing Driver, ϕ28:
57001-1610



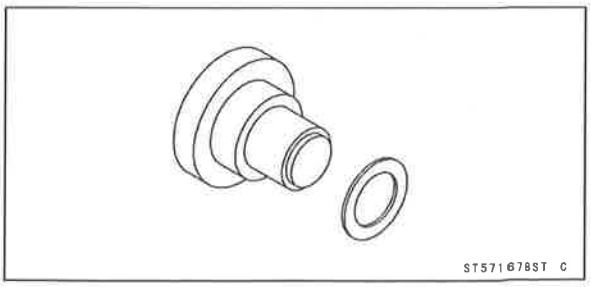
Spacer, ϕ18:
57001-1636



Spacerϕ28:
57001-1663

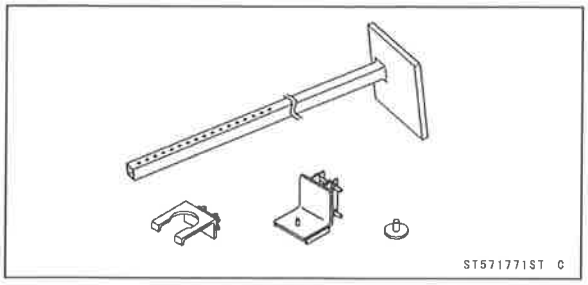


Needle Bearing Driver, ϕ20 & Spacer, ϕ28:
57001-1678



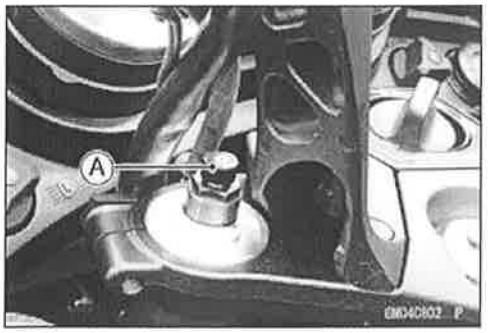
Special Tools

Fork Spring Compressor:
57001-1771



Front Fork

Rebound Damping Force Adjustment

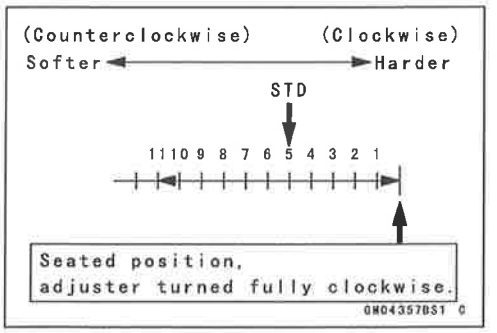


- To adjust the rebound damping force, turn the rebound damping adjuster [A] until you feel a click.

○The standard adjuster setting is the **5th click** from the 1st click of the fully clockwise position.

⚠ WARNING

If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result. Be sure the adjusters are set equally.

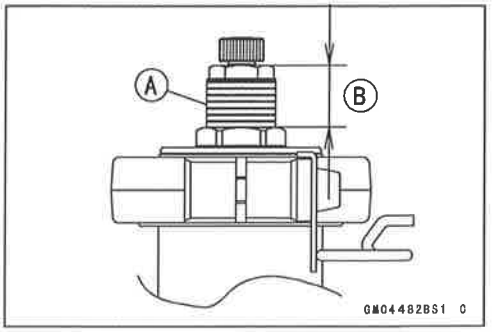


○The damping force can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the damping feels too soft or too stiff, adjust it in accordance with the following table.

Rebound Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
11	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High

Spring Preload Adjustment



- Turn the spring preload adjuster [A] to change spring preload setting.

○The standard adjuster setting is the 14 mm (0.55 in.) [B] from top as shown in the figure.

Adjuster Protrusion (from top)
Standard: **14 mm (0.55 in.)**
Usable Range: **4 ~ 19 mm (0.16 ~ 0.75 in.)**

⚠ WARNING

If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result. Be sure the adjusters are set equally.

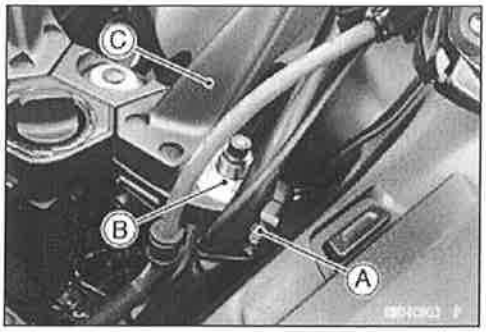
○The spring preload can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the spring action feels too soft or too stiff, adjust it in accordance with the following table.

Spring Action

Adjuster Position	Damping Force	Setting	Load	Road	Speed
19 mm	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
4 mm	Strong	Hard	Heavy	Bad	High

Front Fork

Front Fork Removal (Each Fork Leg)



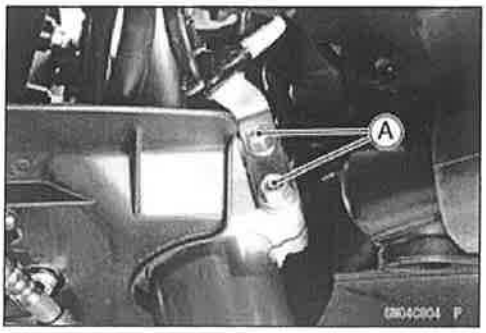
- Remove the front wheel (see Front Wheel Removal in the Wheels/Tires chapter).
- Loosen the upper front fork clamp bolt [A].

★Loosen the fork top plug [B] beforehand if the fork leg is to be disassembled.

○Remove the handlebar holder [C] with handlebar assy (see Handlebar Holder Removal in the steering chapter).

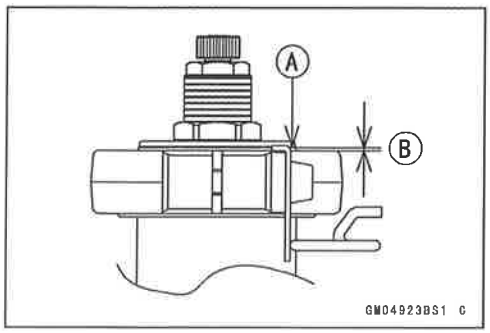
NOTE

○Loosen the top plug after loosening the upper fork clamp bolt.



- Remove the upper inner fairing (see Upper Inner Fairing Removal in the Frame chapter).
- Loosen the lower fork clamp bolts [A].
- With a twisting motion, work the fork leg down and out.

Front Fork Installation



- Install the fork so that the top end [A] of the outer tube as shown.
  1 mm (0.04 in.) [B]
- Tighten:

Torque - Front Fork Clamp Bolts (Lower): 30 N·m (3.1 kgf·m, 22 ft·lb)
Front Fork Top Plug: 23 N·m (2.3 kgf·m, 17 ft·lb)

- Tighten:

Torque - Front Fork Clamp Bolt (Upper): 20 N·m (2.0 kgf·m, 15 ft·lb)

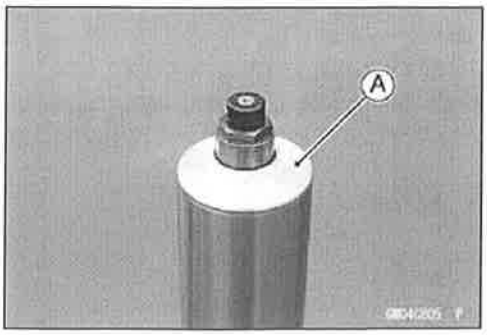
NOTE

○Tighten the lower clamp bolts alternately two times to ensure even tightening torque.

○Tighten the top plug before tightening the upper fork clamp bolt.

- Install the removed parts (see appropriate chapters).
- Adjust the spring preload and the damping force.

Front Fork Oil Change



- Remove the front fork (see Front Fork Removal).
- Hold the inner tube lower end in a vise.
- Unscrew the top plug [A] out of the outer tube.

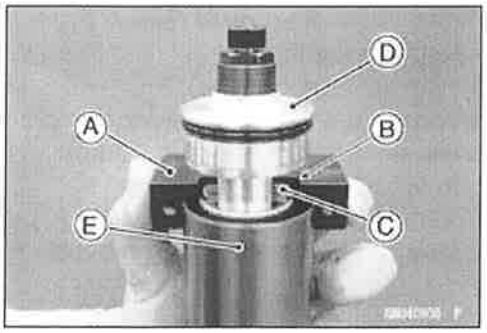
Front Fork

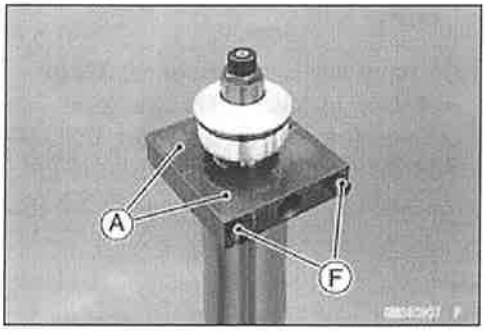
- Install the clamps [A] as shown.

NOTE

○Set the cutout [B] of the clamp to the plate [C] of top plug [D], pull up the outer tube [E] to hold it by the clamps, and then tighten the two bolts [F]. The outer tube is used as a guide.

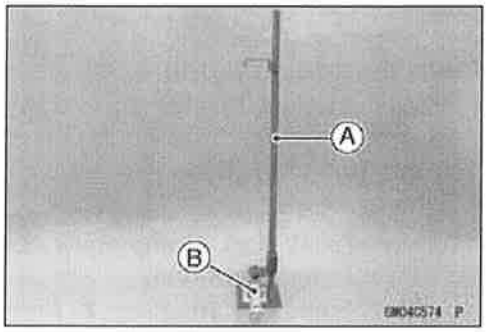
Special Tool - Fork Spring Compressor: 57001-1540



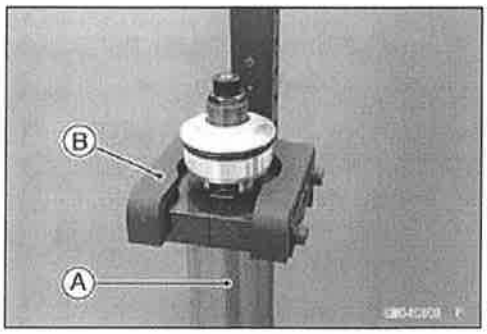


- Set the spring compressor [A] and suitable jack [B] as shown.

Special Tool - Fork Spring Compressor: 57001-1771



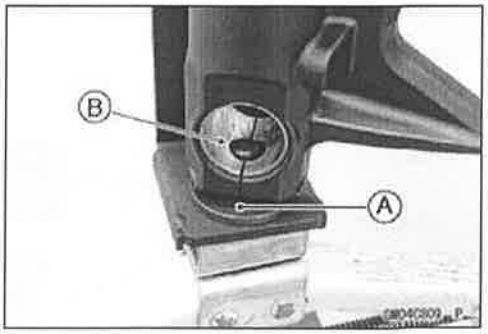
- Set the front fork [A] under the holder [B].



- Insert the projection of the protector [A] into the front fork bottom hole [B].

○Remove the front axle clamp bolt.

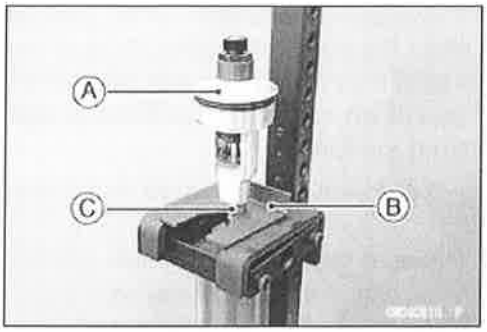
- Lift up the suitable jack until the piston rod nut comes out.



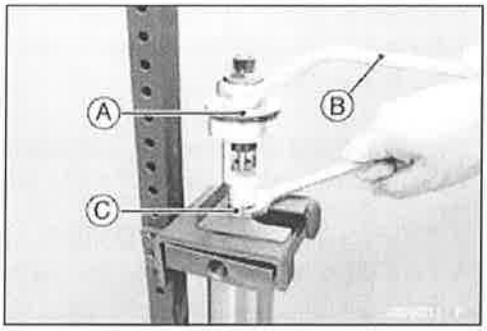
Front Fork

- While holding the top plug [A], insert the fork spring stopper [B] between the piston rod nut [C] and the holder.

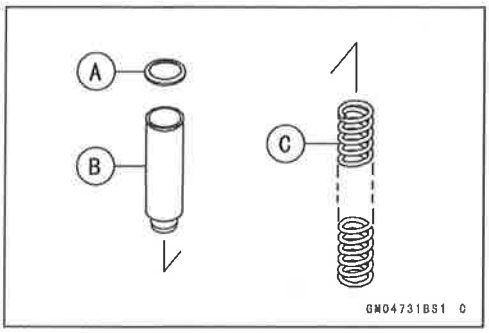
Special Tool - Fork Spring Stopper: 57001-1374



- Holding the top plug [A] with a wrench [B], loosen the piston rod nut [C].



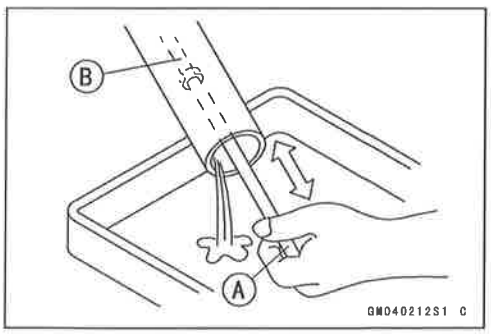
- Remove:
  Top Plug
  Rebound Damping Adjuster Rod (Right Front Fork Only)
  Washer [A]
  Collar [B]
  Fork Spring [C]



- Drain the fork oil into a suitable container.

○Using the piston rod puller [A], pump the piston rod [B] up and down at least ten times to expel the oil from the fork.

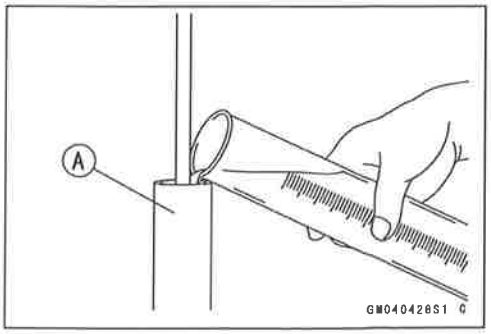
Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298



- Hold the fork tube upright, press the outer tube [A] and the piston rod all the way down.
- Pour in the type and amount of fork oil specified.

Suspension Oil - KHL15-10 (1 L): 44091-0004
KHL15-10 (4 L): 44091-0013

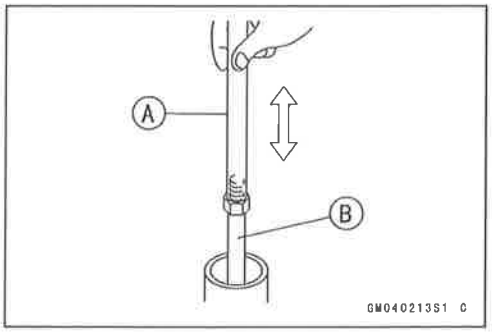
Amount (Per Side):
When changing oil:
Approx. 470 mL (15.9 US oz.)
After disassembly and completely dry:
551 ±4 mL (18.6 ±0.135 US oz.)



Front Fork

★If necessary, measure the oil level as follows.
○Hold the inner tube vertically in a vise.
○Using the piston rod puller [A], move the piston rod [B] up and down more than ten times in order to expel all the air from the fork oil.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298



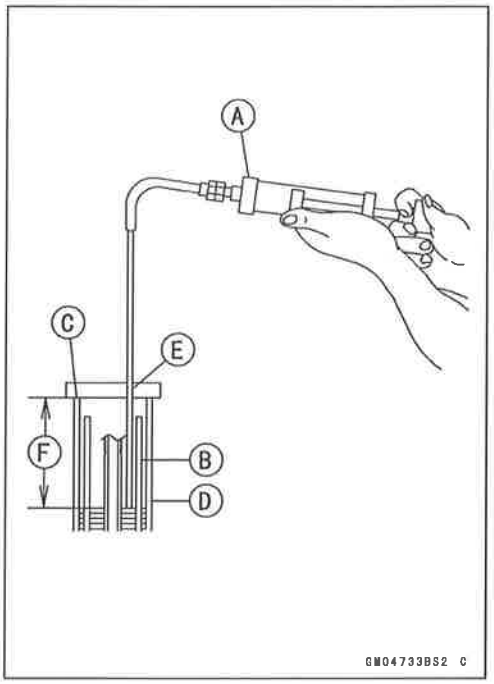
○Remove the piston rod puller.
○Wait until the oil level settles.
○With the fork fully compressed and the piston rod fully pushed in, insert a tape measure or rod into the inner tube, and measure the distance from the top of the outer tube to the oil.

Oil Level (fully compressed, without spring)
Standard: 93 ±2 mm (3.7 ±0.08 in.)

NOTE

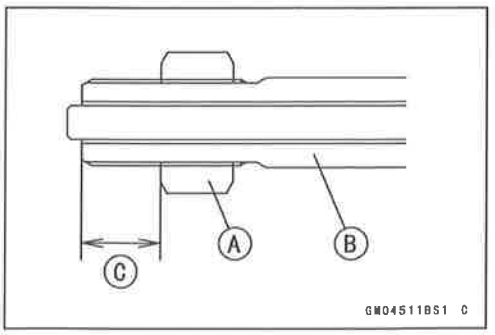
○*Fork oil level may also be measured using the fork oil level gauge.*

Special Tool - Fork Oil Level Gauge [A]: 57001-1290



○With the fork fully compressed and without fork spring, insert the gauge tube into the inner tube [B] and position the stopper across the top end [C] of the outer tube [D].
○Set the gauge stopper [E] so that its lower side shows the oil level distance specified [F].
○Pull the handle slowly to pump out the excess oil until the oil no longer comes out.
★If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.

● Screw the rod nut [A] onto the piston rod [B] as shown. 12 mm (0.47 in.) or more [C]

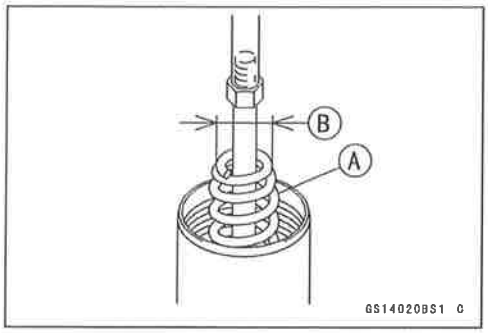


Front Fork

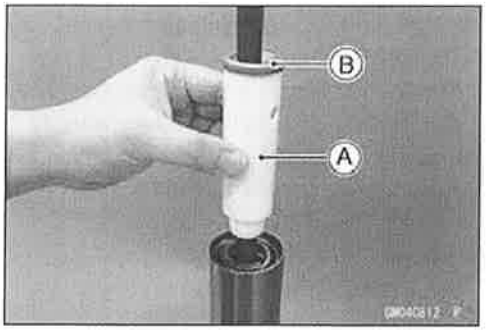
- Screw the fork piston rod puller onto the end of the piston rod.

  Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298

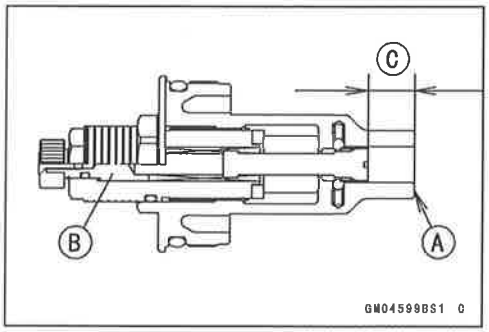
- Install the fork spring [A] with the smaller end [B] facing upward.



- Install:
  Collar [A]
  Washer [B]



- Check the distance between the bottom end [A] of the top plug and rebound damping adjuster [B] with a pair of vernier caliper.
  13 mm (0.51 in.) or more [C]

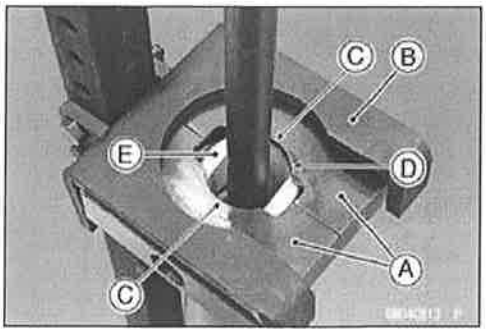


- Install the clamps [A] as shown.
- Set the front fork under the holder [B].

  Special Tools - Fork Spring Compressor: 57001-1540
  Fork Spring Compressor: 57001-1771

NOTE

○*Set the clamps so that the cutouts [C] do not fit the hole [D] of the washer [E].*



- While holding up the piston rod puller, insert the fork spring stopper between the piston rod nut and the holder.

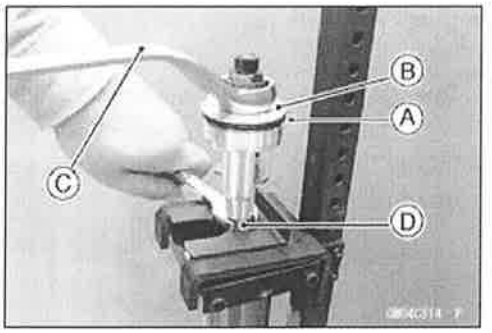
  Special Tool - Fork Spring Stopper: 57001-1374

- Remove the piston rod puller.
- Insert the rebound damping adjuster rod into the holes of the piston rod.

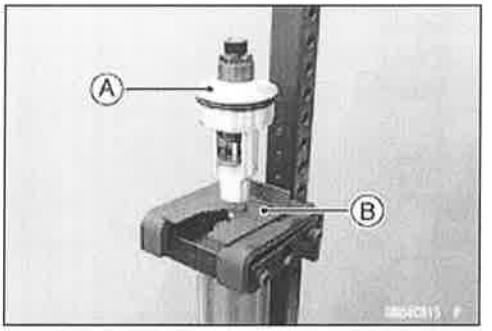
Front Fork

- Replace the O-ring [A] on the top plug [B] with a new one.
- Apply grease to the new O-ring.
- Screw in the top plug until it stops onto the piston rod.
- Holding the top plug with a wrench [C], tighten the piston rod nut [D] against the top plug.

Torque - Piston Rod Nut: 15 N·m (1.5 kgf·m, 11 ft·lb)



- While holding up the top plug [A], pull out the fork spring stopper [B].
- Remove the fork spring compressor.
- Raise the outer tube and screw the top plug into it.
- Install the front fork (see Front Fork Installation).
- Adjust the spring preload (see Spring Preload Adjustment).
- Adjust the rebound damping force (see Rebound Damping Force Adjustment).



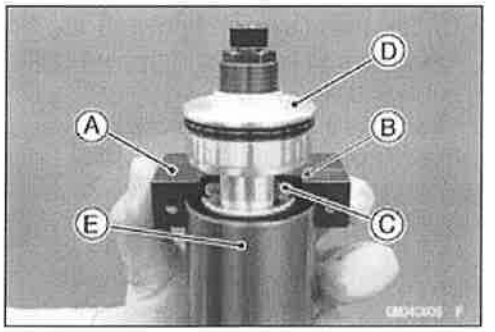
If using the spring compressor (57001-1587)

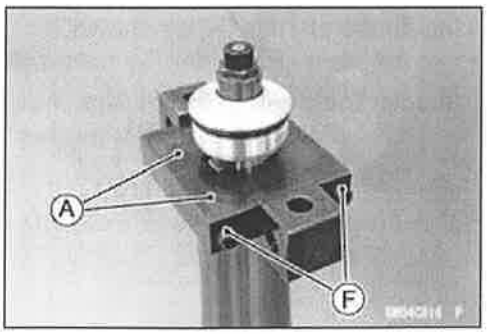
- Install the clamps [A] as shown.

NOTE

○*Set the cut out [B] of the clamp to the plate [C] of the top plug [D] pull up the outer tube [E] to hold it by the clamps, and then tighten the two bolts [F]. The outer tube is used as a guide.*

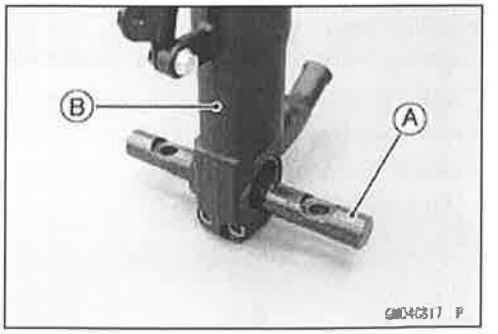
Special Tools - Fork Spring Compressor: 57001-1540
Fork Spring Compressor: 57001-1587





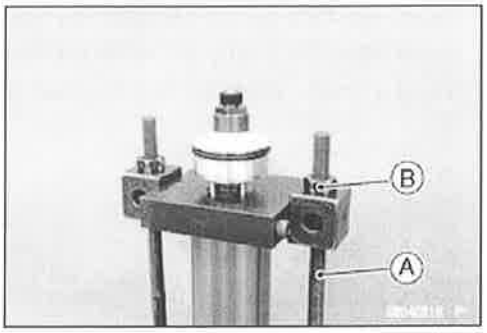
- Insert the holder bar [A] into the axle hole of the front fork [B].

○Position the bar left and right evenly.

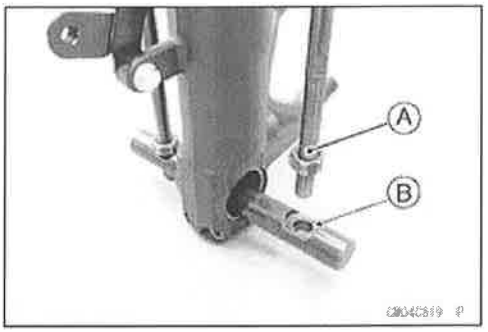


Front Fork

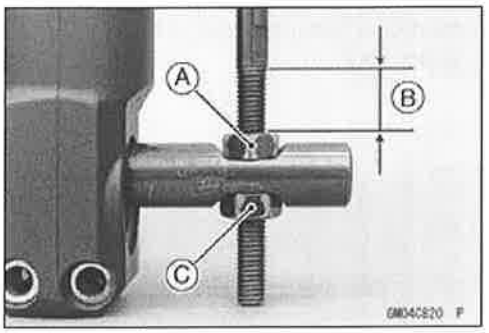
- Insert the compression shaft [A] and install the nut [B].



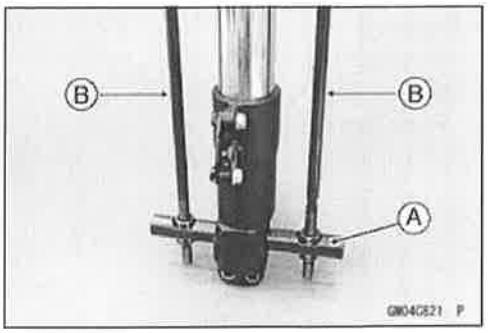
- Insert the lower end of the compression shaft [A] into the hole [B] of the holder bar.



- Screw the adjust nut [A] onto the compression shaft as shown.
  20 mm (0.79 in.) [B]
- Screw the locknut [C].
- Set the other side compression shaft same process.

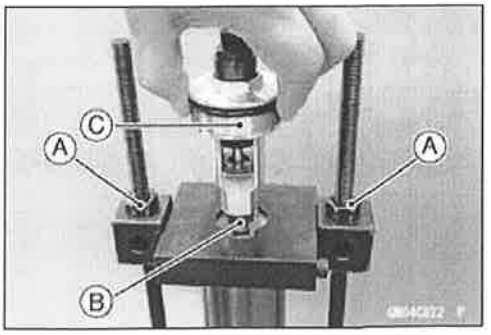


- Set the holder bar [A] and compression shafts [B].



- Screw in the nuts [A] until the piston rod nut [B] comes out.

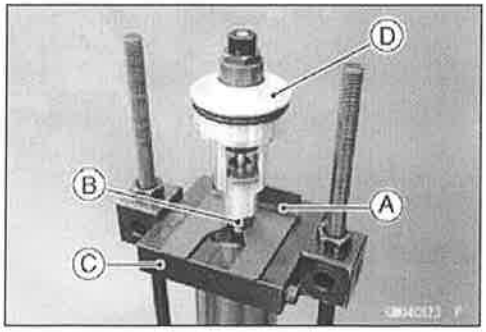
○Hold up the top plug [C] while screwing in the nut.



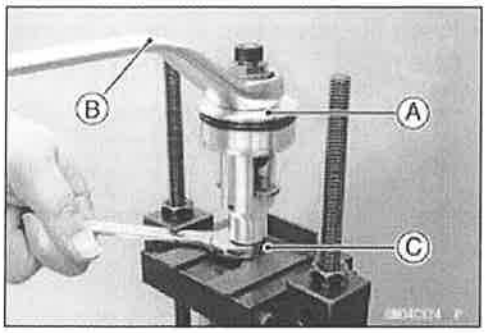
Front Fork

- Insert the fork spring stopper [A] between the piston rod nut [B] and the clamp [C] while holding up the top plug [D].

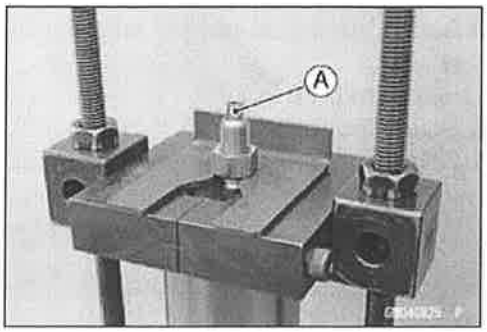
Special Tool - Fork Spring Stopper: 57001-1374



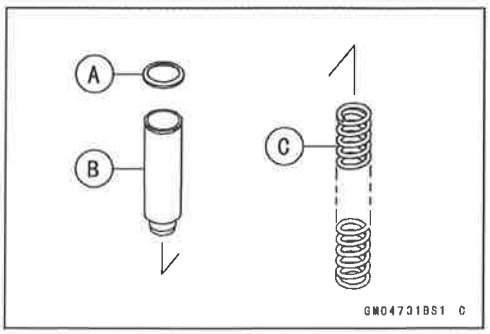
- Holding the top plug [A] with a wrench [B], loosen the piston rod nut [C].
- Remove the top plug.



- Remove the rebound damping adjuster rod [A] from the piston rod.



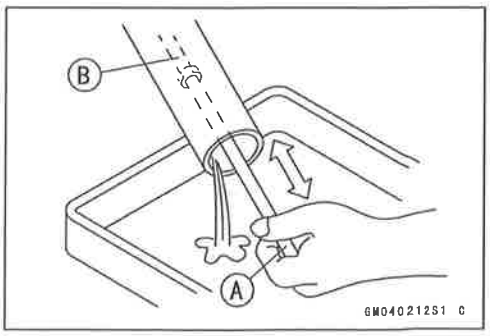
- Remove:
  Washer [A]
  Collar [B]
  Fork Spring [C]



- Drain the fork oil into a suitable container.

○Using the fork piston rod puller [A], pump the piston rod [B] up and down at least ten times to expel the oil from the fork.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298

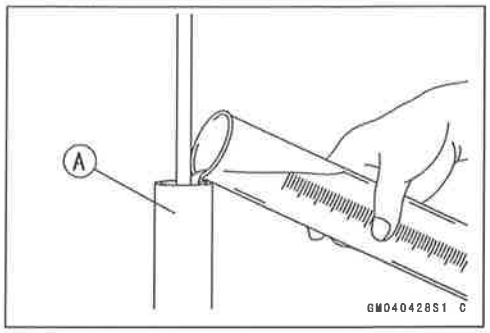


Front Fork

- Hold the fork tube upright, press the outer tube [A] and the piston rod all the way down.
- Pour in the type and amount of fork oil specified.

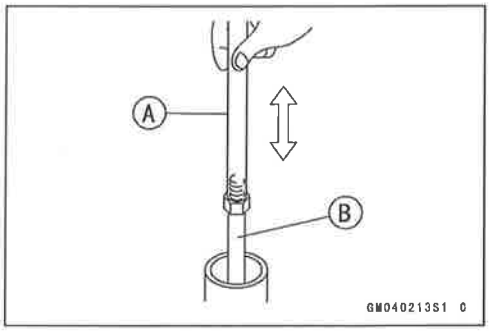
Suspension Oil - KHL15-10 (1 L): 44091-0004
KHL15-10 (4 L): 44091-0013

Amount (Per Side):
When changing oil:
Approx. 470 mL (15.9 US oz.)
After disassembly and completely dry:
551 ±4 mL (18.6 ±0.135 US oz.)



★If necessary, measure the oil level as follows.
○Hold the inner tube vertically in a vise.
○Using the fork piston rod puller [A], move the piston rod [B] up and down more than ten times in order to expel all the air from the fork oil.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298



○Remove the fork piston rod puller.
○Wait until the oil level settles.
○With the fork fully compressed and the piston rod fully pushed in, insert a tape measure or rod into the inner tube, and measure the distance from the top of the outer tube to the oil.

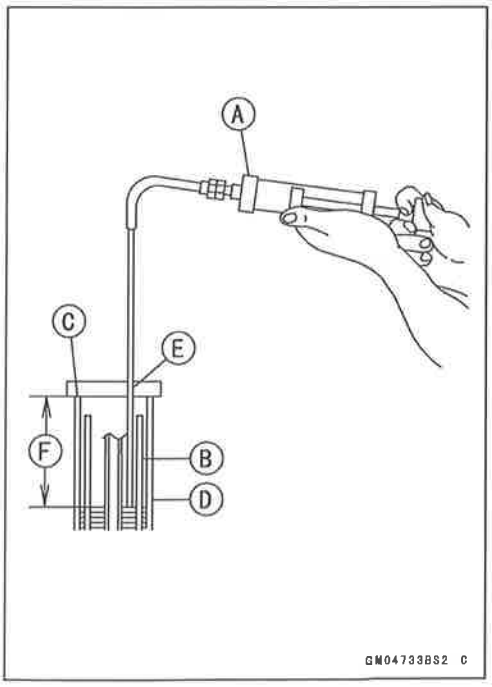
Oil Level (fully compressed, without spring)
Standard: 93 ±2 mm (3.7 ±0.08 in.)

NOTE

○*Fork oil level may also be measured using the fork oil level gauge.*

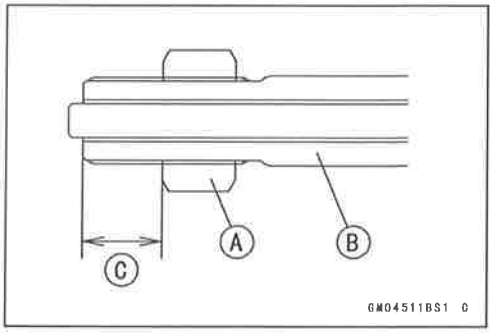
Special Tool - Fork Oil Level Gauge [A]: 57001-1290

○With the fork fully compressed and without fork spring, insert the gauge tube into the inner tube [B] and position the stopper across the top end [C] of the outer tube [D].
○Set the gauge stopper [E] so that its lower side shows the oil level distance specified [F].
○Pull the handle slowly to pump out the excess oil until the oil no longer comes out.
★If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.



Front Fork

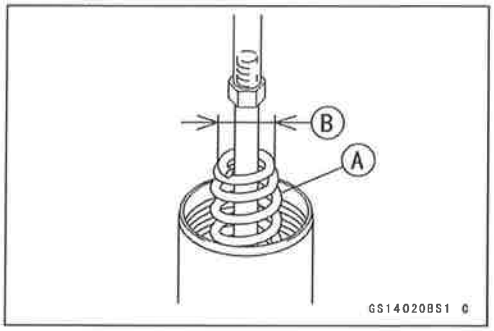
- Screw the piston rod nut [A] onto the piston rod [B] as shown in the figure.
  12 mm (0.47 in.) or more [C]



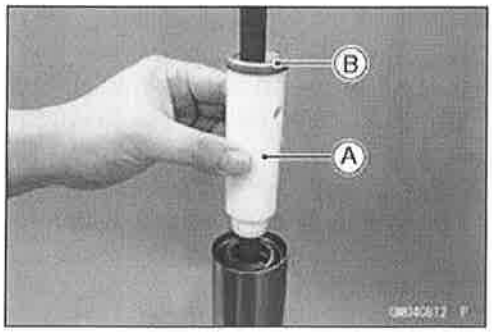
- Screw the fork piston rod puller onto the end of the piston rod.

  Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298

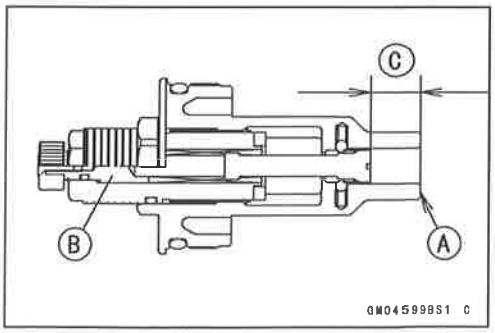
- Pull the puller up above the outer tube top.
- Install the fork spring [A] with the smaller end [B] facing upward.



- Install:
  Collar [A]
  Washer [B]



- Check the distance between the bottom end [A] of the top plug and rebound damping adjuster [B] with a pair of vernier caliper.
  13 mm (0.51 in.) [C]

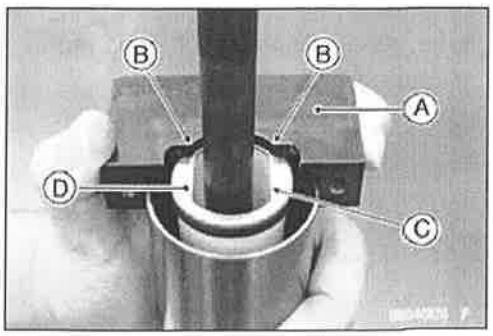


- Install the clamps [A] as shown.

  Special Tools - Fork Spring Compressor: 57001-1540
  Fork Spring Compressor: 57001-1587

NOTE

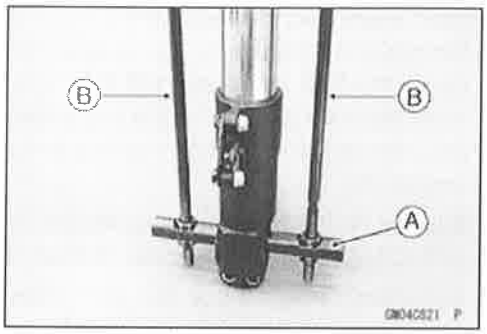
○*Set the clamps so that the cutouts [B] do not fit the hole [C] of the washer [D].*



Front Fork

- Set the holder bar [A] and compression shafts [B].
- Screw in the fork compressor nut come out the piston rod nut.

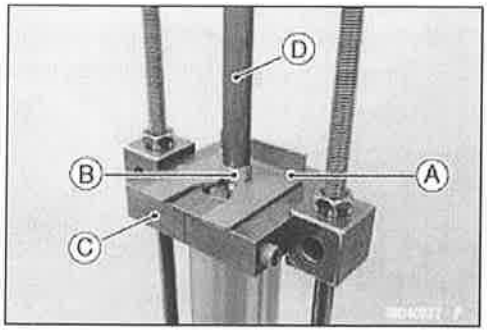
○Hold up the fork piston rod puller while screwing in the nut.



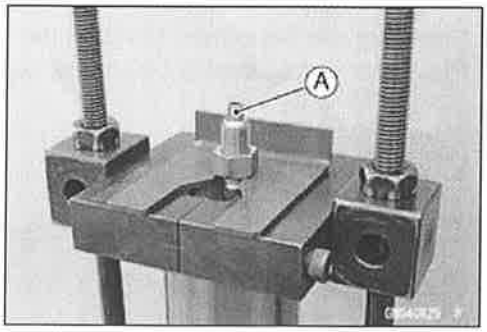
- Insert the fork spring stopper [A] between the piston rod nut [B] and the clamp [C] while holding up the fork piston rod puller [D].

Special Tool - Fork Spring Stopper: 57001-1374

- Remove the fork piston rod puller.

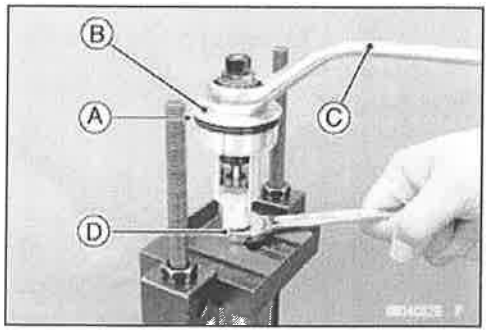


- Install the rebound damping adjuster rod [A].



- Replace the O-ring [A] on the top plug [B] with a new one.
- Apply grease to the new O-ring.
- Screw in the top plug until it stops onto the piston rod.
- Holding the top plug with a wrench [C], tighten the piston rod nut [D] against the top plug.

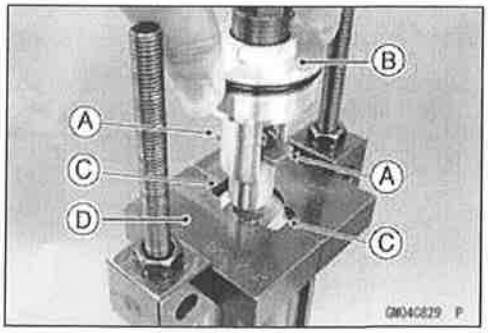
Torque - Piston Rod Nuts: 15 N·m (1.5 kgf·m, 11 ft·lb)



- Remove the fork spring stopper.
- Align the stoppers [A] of the top plug [B] with the grooves [C] of the clamp [D], and loosen the fork spring compressor nut.
- Remove the clamp and fork spring compressor.
- Raise the outer tube and screw the top plug into it.
- Install the front fork (see Front Fork Installation).

NOTE

○*After installing the front fork, adjust the spring preload and damping force correctly.*



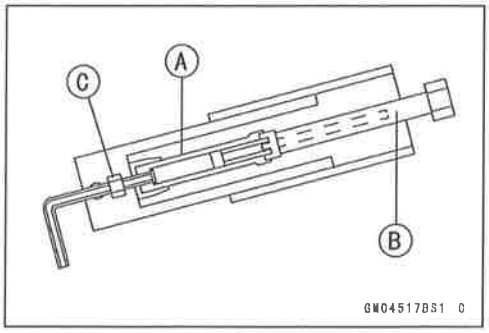
Front Fork

Front Fork Disassembly

- Remove the front fork (see Front Fork Removal).
- Drain the fork oil (see Front Fork Oil Change).
- Hold the axle portion of the front fork in a vise.
- Stop the cylinder [A] from turning by using the fork cylinder holder [B].

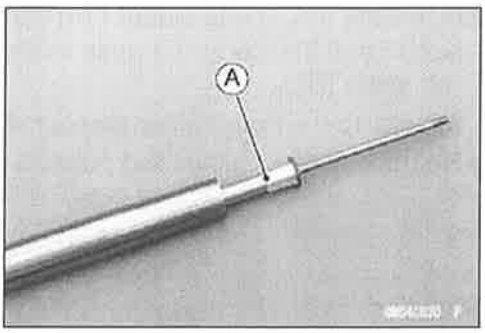
Special Tool - Fork Cylinder Holder, Hex 24: 57001-1537 or Fork Cylinder Holder: 57001-1443

- Unscrew the Allen bolt [C], then take the bolt and gasket out of the bottom of the inner tube.

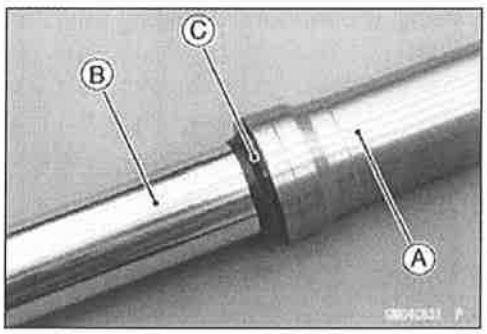


- Take the cylinder unit [A] out of the inner tube.

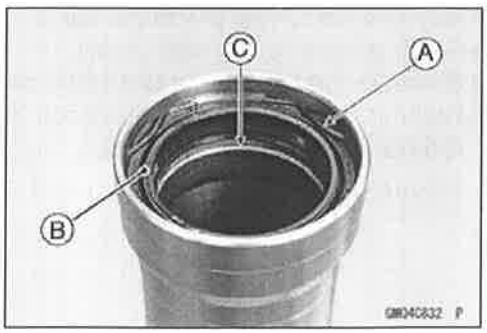
○Do not disassemble the cylinder unit.



- Separate the outer tube [A] from the inner tube [B].
- Pull out the dust seal [C] from the outer tube.



- Remove the following parts from the outer tube.
  - Retaining Ring [A]
  - Oil Seal [B]
  - Washer [C]



Front Fork Assembly

- Replace the following parts with new ones.
  - Dust Seal
  - Oil Seal
  - Retaining Ring
  - Bottom Allen Bolt Gasket

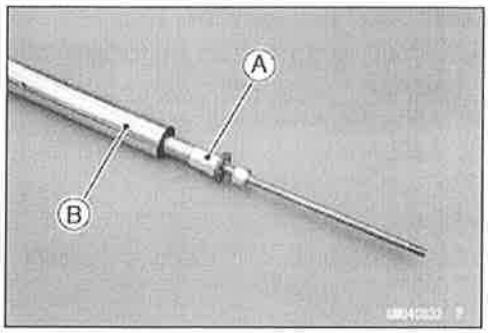
Front Fork

- Insert the cylinder unit [A] into the inner tube [B].
- Stop the cylinder from turning by using the fork cylinder holder.

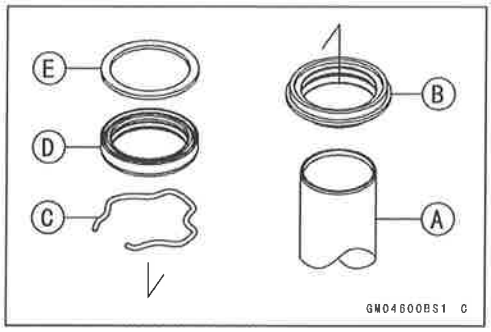
Special Tool - Fork Cylinder Holder, Hex 24: 57001-1537 or Fork Cylinder Holder: 57001-1443

- Apply a non-permanent locking agent to the thread of the Allen bolt, and tighten it.

Torque - Front Fork Bottom Allen Bolt: 23 N·m (2.3 kgf·m, 17 ft·lb)



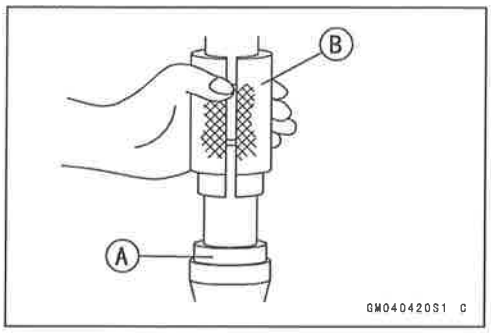
- Install the following parts into the inner tube [A].
  Dust Seal [B]
  Retaining Ring [C]
  Oil Seal [D]
  Washer [E]



- Insert the inner tube to the outer tube.
- After installing the washer, install the oil seal [A] by using the fork oil seal driver [B].

Special Tool - Fork Oil Seal Driver, ϕ43: 57001-1530

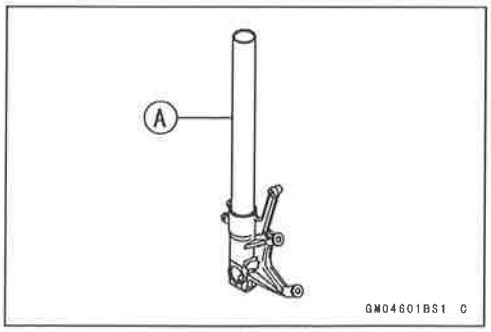
- Install the retaining ring and dust seal.
- Pour in the specified type of oil (see Front Fork Oil Change).



Inner Tube Inspection

- Visually inspect the inner tube [A].

★If there is any damage, replace the inner tube. Since damage to the inner tube damages the oil seal and dust seal, replace the oil seal and dust seal whenever the inner tube is replaced.

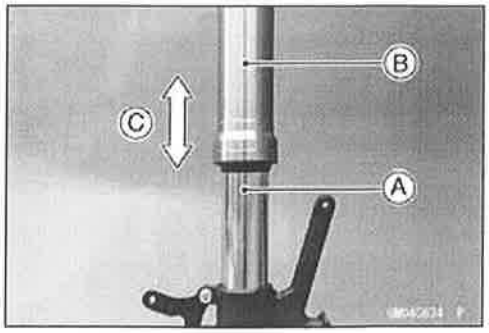


NOTICE

If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

- Temporarily assemble the inner tube [A] and outer tube [B], and pump [C] them back and forth manually to check for smooth operation.

★If you feel binding or catching, the inner and outer tubes must be replaced.



⚠ WARNING

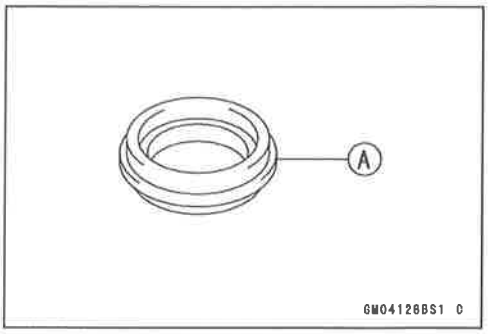
A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

Front Fork

Dust Seal Inspection

- Inspect the dust seals [A] for any signs of deterioration or damage.

★Replace it if necessary.



Spring Tension

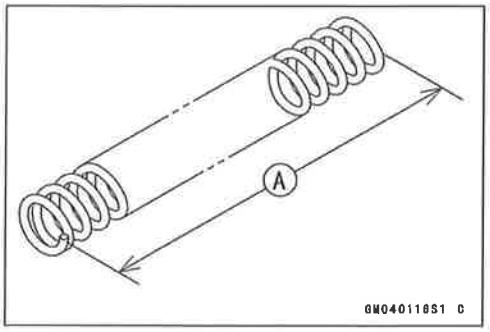
- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Spring Free Length

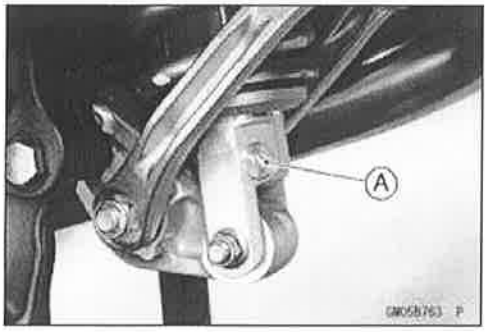
Standard: 244 mm (9.61 in.)

Service Limit: 240 mm (9.45 in.)



Rear Shock Absorber

Rebound Damping Force Adjustment

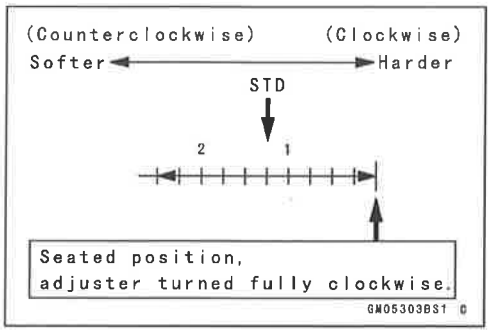


- To adjust the rebound damping force, turn the lower damping adjuster [A] to the desired position, until you feel a click.

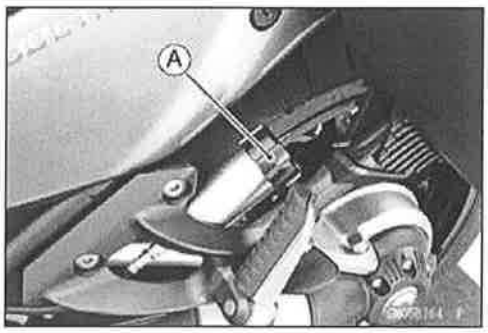
○The standard adjuster setting is the **1 1/4 turns out** from the fully clockwise position.

Rebound Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
2 2/4 Turns Out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High



Spring Preload Adjustment



- To adjust the spring preload, turn in the adjuster [A] until you fee a click to the desired position.

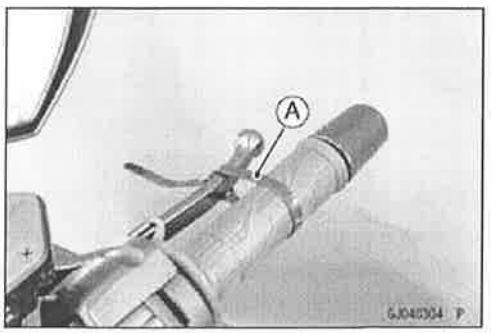
○The standard adjuster setting is the **10th click** from the 1st click of the fully counterclockwise position.

★If the spring action feels too soft or too stiff, adjust it.

Spring Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
0	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
24	Strong	Hard	Heavy	Bad	High

Rear Shock Absorber Removal



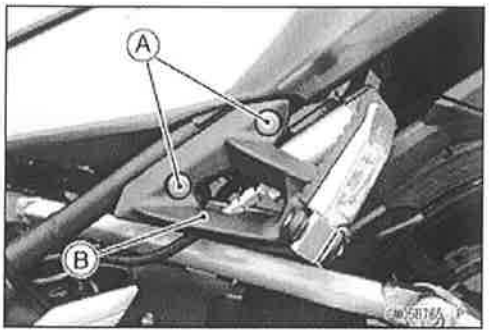
- Use the center stand to support the motorcycle upright.
- Squeeze the brake lever slowly and it with a band [A].

⚠ WARNING

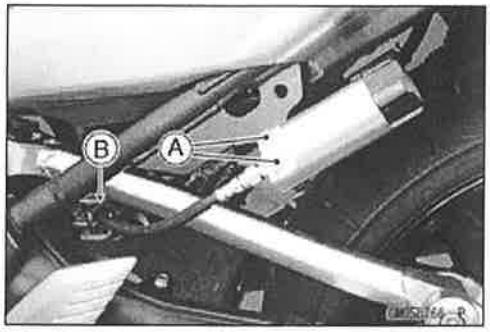
When raising the rear wheel off the ground with the center stand and removing part(s) from the motorcycle, be sure to hold the front brake, or the motorcycle may fall over. It could cause an accident and injury.

Rear Shock Absorber

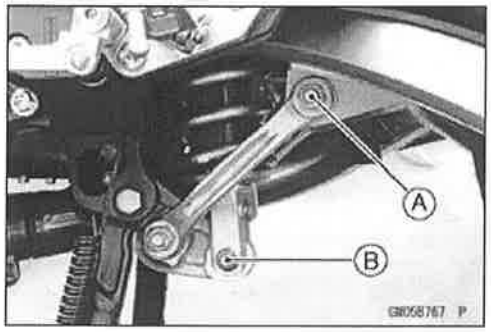
- Remove:
  Left Saddlebag (see Saddlebag Removal in the Frame chapter)
  Bolts [A]
  Left Rear Footpeg Bracket [B] with Rear Footpeg



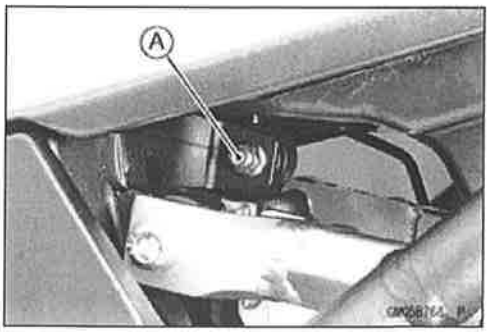
- Remove the spring preload adjuster bolts [A].
- Clear the hose form the clamp [B].



- Remove:
  Upper Tie-Rod Nut and Bolt [A]
  Rear Shock Absorber Nut and Bolt (Lower) [B]

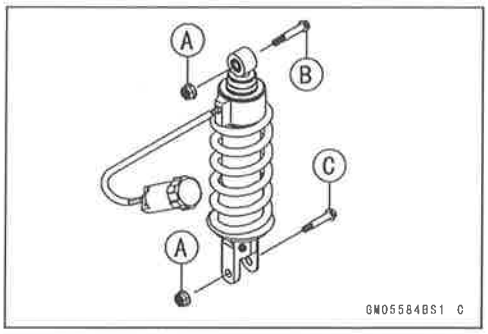


- Remove the rear shock absorber nut and bolt (upper) [A].
- Remove the shock absorber downward.



Rear Shock Absorber

Rear Shock Absorber Installation



- Installation is the reverse of removal.
- Replace the rear shock absorber nuts [A] and tie-rod nuts with new ones.
- Tighten:

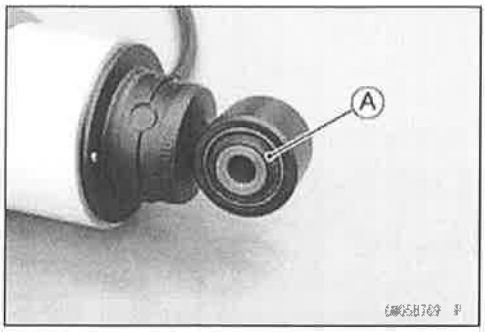
Torque - Rear Shock Absorber Nut (Upper): 45 N·m (4.6 kgf·m, 33 ft·lb)
Rear Shock Absorber Nut (Lower): 35 N·m (3.6 kgf·m, 26 ft·lb)
Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

L = 62 mm (2.4 in.) [B]
L = 55 mm (2.2 in.) [C]

- Tighten:

Torque - Spring Preload Adjuster Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)

Rear Shock Absorber Inspection



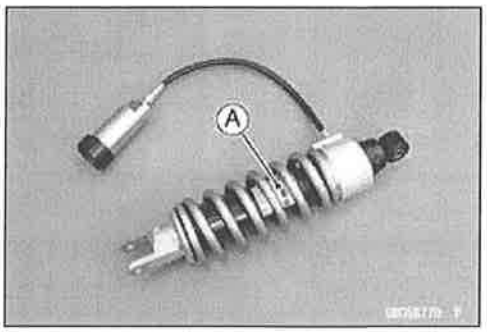
- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Visually inspect the following items.
  Oil Leakage
  Crack or Dent

★If there is any damage to the rear shock absorber, replace it.

- Visually inspect the rubber bushing [A].

★If it show any signs of damage, replace it.

Rear Shock Absorber Scrapping



⚠ WARNING

Pressurized nitrogen may explode when heated. The rear shock contains nitrogen gas. To avoid an explosion, do not incinerate the shock body without first releasing the nitrogen and removing the shraeder valve.

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Drill the cylinder [A] of the shock absorber using about 2 mm (0.08 in.) drillbit.

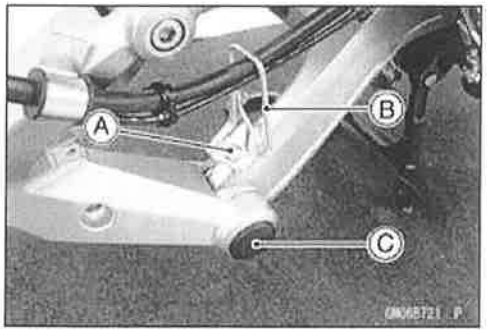
⚠ WARNING

Pressurized gas can cause injury. Do not point the drill toward your face or body.

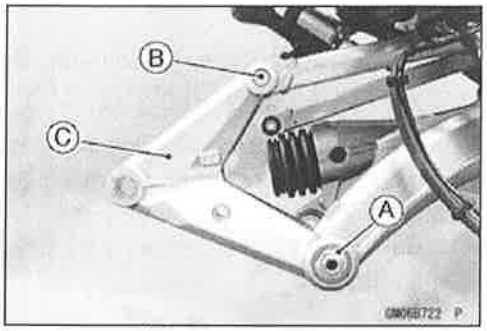
Swingarm

Swingarm Removal

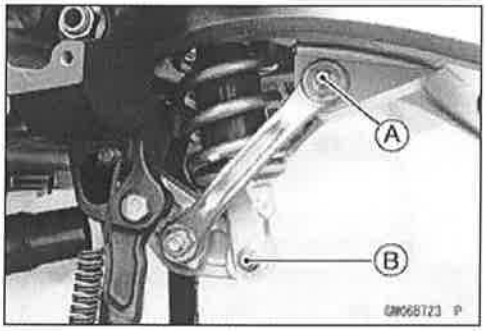
- Use the center stand to support the motorcycle uptight.
- Remove:
  Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
  Propeller Shaft (see Propeller Shaft Removal in the Final Drive chapter)
  Muffler Body (see Muffler Body Removal in the Engine Tope End chapter)
  Bolt [A]
  Clamp [B]
  Cap [C]



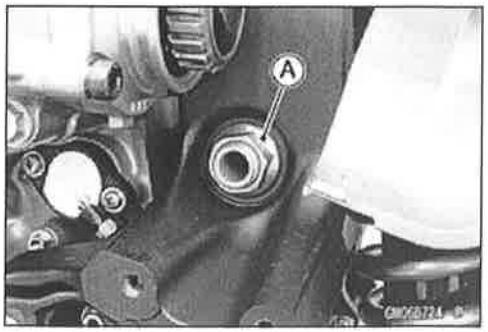
- Remove:
  Axle Bracket Locknut [A] and Bolt
  Torque Rod Nut and Bolt [B]
  Axle Bracket [C]



- Remove:
  Upper Tie-Rod Nut and Bolt [A]
  Lower Rear Shock Absorber Nut and Bolt [B]



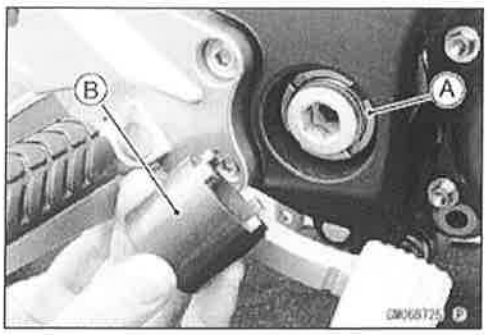
- Remove the swingarm pivot shaft locknut [A].



Swingarm

- Loosen the swingarm pivot collar locknut [A] using the nut wrench [B].

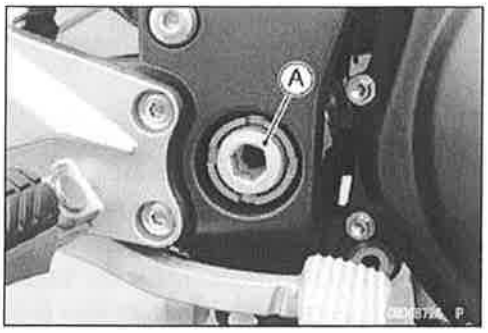
Special Tool - Swingarm Pivot Nut Wrench: 57001-1597



- Turn the swingarm pivot shaft [A] counterclockwise few times.

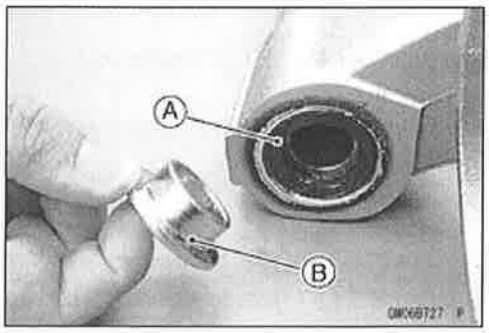
○Turn out the swingarm pivot adjusting collar.

- Pull out the pivot shaft to right side of the motorcycle and remove the swingarm.



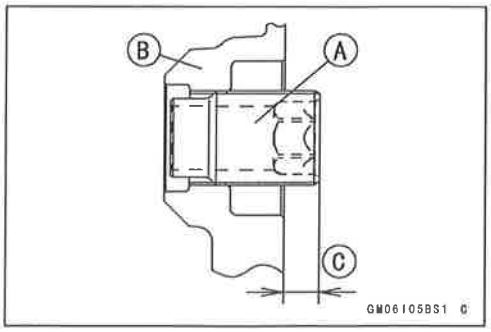
Swingarm Installation

- Apply plenty of grease to the lip of the oil seals [A].
- Install the collar [B] to the left side of the swingarm.



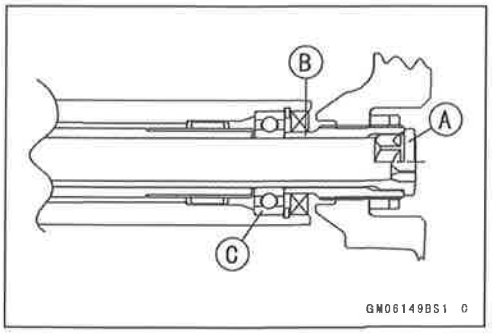
- Place the adjusting collar [A] the frame [B] as shown in the figure.

6 mm (0.43 in.) [C]



- Insert the pivot shaft [A] into the frame from the right side.
- Tighten the pivot shaft so that the clearance between the adjusting collar [B] and the ball bearing [C] come to 0 mm (0 in.).

Torque - Swingarm Pivot Adjusting Collar: 20 N·m (2.0 kgf·m, 15 ft·lb)

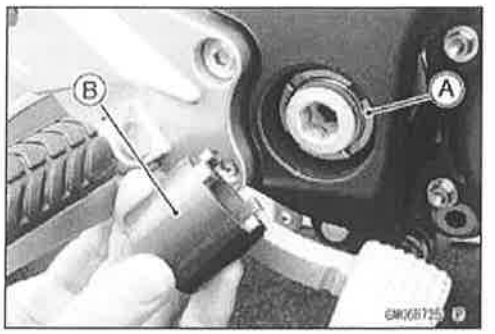


Swingarm

- Tighten the adjusting collar locknut [A] with the swingarm pivot nut wrench [B].

Special Tool - Swingarm Pivot Nut Wrench: 57001-1597

Torque - Swingarm Pivot Adjusting Collar Locknut: 98 N·m (10.0 kgf·m, 72 ft·lb)

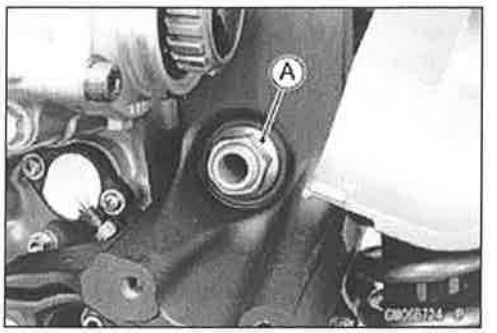


- Tighten the pivot shaft nut [A].

Torque - Swingarm Pivot Shaft Nut: 108 N·m (11.0 kgf·m, 80 ft·lb)

- Install the axle bracket.
- Replace the axle bracket locknut and torque rod nut with new ones.
- Tighten:

Torque - Axle Bracket Locknut: 98 N·m (10 kgf·m, 72 ft·lb)
Torque Rod Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)

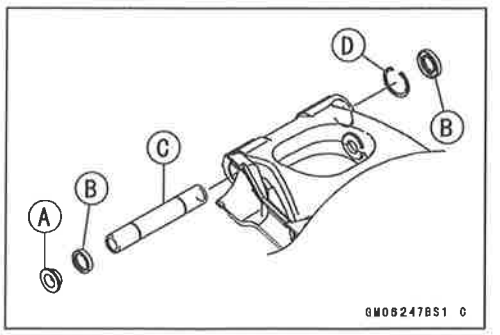


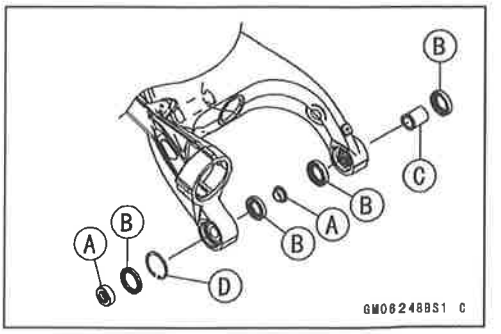
- Install the removed parts (see appropriate chapters).

Swingarm Bearing Removal

- Remove:
  Swingarm (see Swingarm Removal)
  Collar [A]
  Grease Seals [B]
  Sleeve [C]
  Circlip [D] (Right Side)

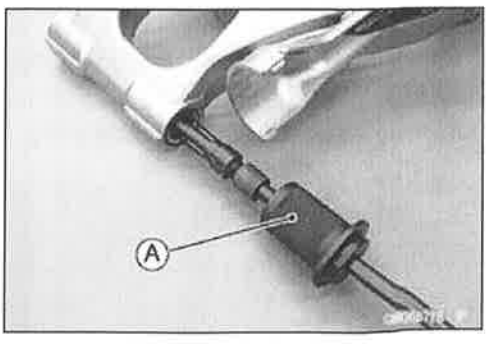
Special Tool - Inside Circlip Pliers: 57001-143





- Remove the ball bearing and needle bearings.

Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058

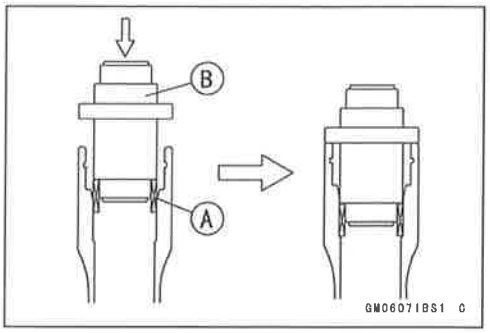


Swingarm

Swingarm Bearing Installation

- Replace the ball and needle bearings [A] with new ones.
- Install the ball and needle bearings so that the manufacturer's marks face out.

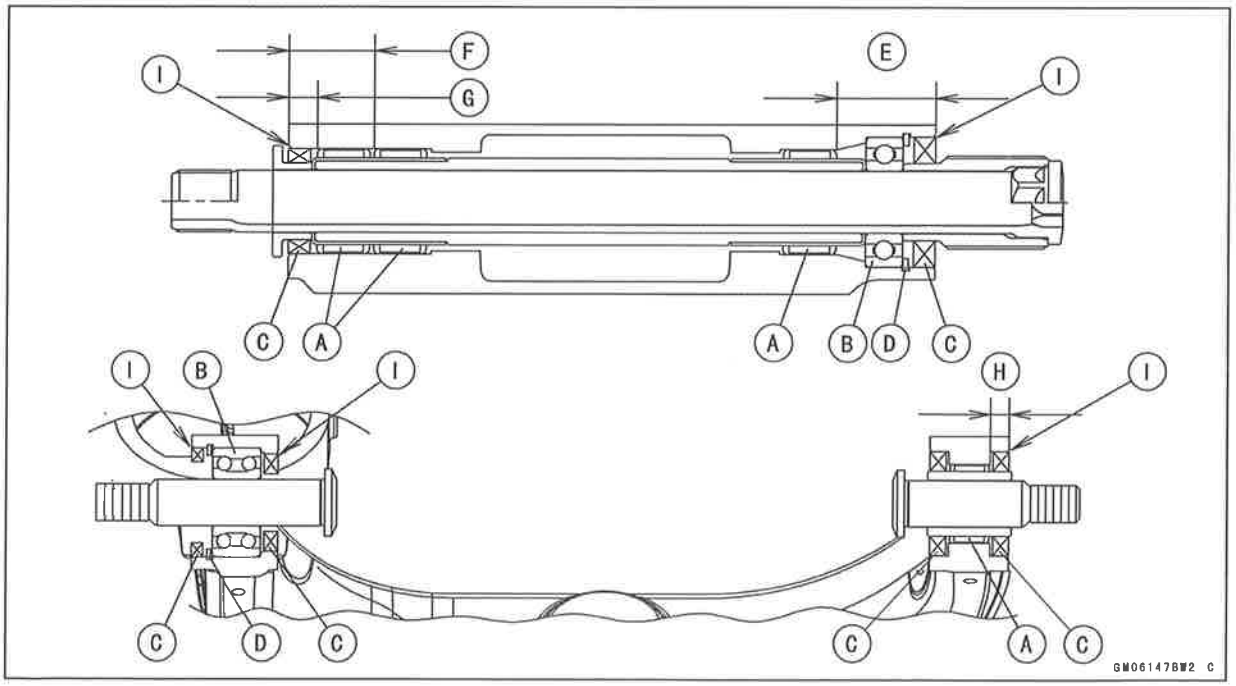
Special Tools - Bearing Driver Set: 57001-1129
Needle Bearing Driver, ϕ28 [B]: 57001-1610
Spacer ϕ28: 57001-1663



- Install the needle bearings [A], ball bearing [B], circlip [D] and oil seals [C] position as shown.

○Press in the ball bearing until it is bottomed.
32 ±0.4 mm (1.26 ±0.02 in.) [E]
27.5 ±0.4 mm (1.08 ±0.02 in.) [F]
9.2 ±0.4 mm (0.36 ±0.02 in.) [G]
8.5 ±0.4 mm (0.33 ±0.02 in.) [H]

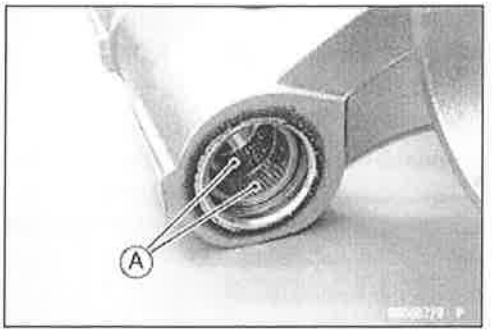
- Press in the grease seals so that the seal surface is flush [I] with the swingarm surfaces.



Swingarm

Swingarm Bearing, Sleeve Inspection

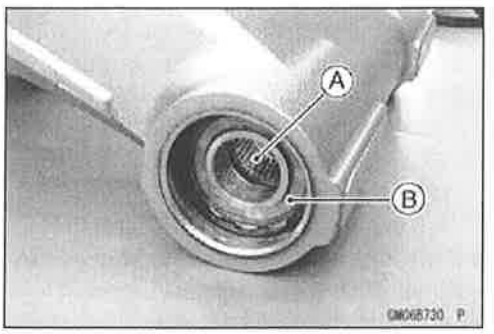
NOTICE
Do not remove the bearings for inspection. Removal may damage them.



- Inspect the needle bearings [A] and ball bearing [B] installed in the swingarm.

○The rollers and ball in a bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.

★If the needle bearing and sleeve show any sings of abnormal wear, discoloration, or damage, replace them as a set.

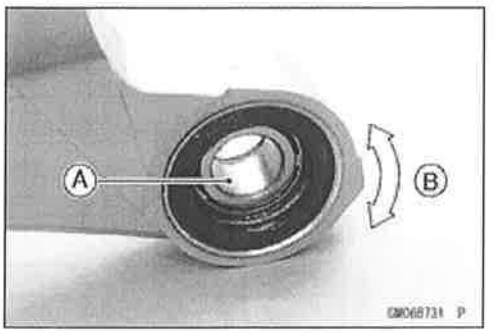


- Turn the bearing [A] in the swingarm back and forth [B] while checking for play, roughness, or binding.

★If bearing play, roughness, or binding is found, replace the bearing.

- Examine the bearing seal for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.

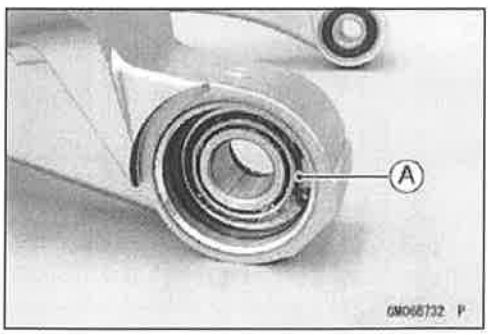


Swingarm Bearing Lubrication

- Clean and grease the swingarm bearing [A] of rear left side.

NOTE

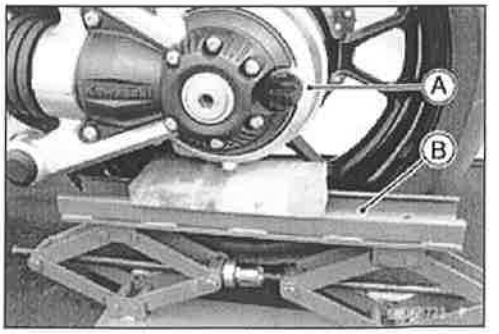
○*Since the other swingarm bearings are packed with grease and sealed, lubrication is not required.*



Torque Rod Removal

- Use the center stand to support the motorcycle upright.
- Support the final gear case [A] with the jack [B].

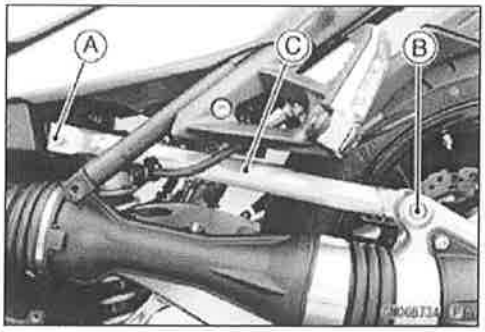
Special Tool - Jack: 57001-1238



Swingarm

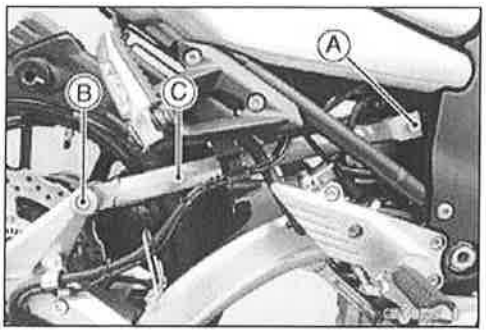
Left Side

- Remove:
  Left Frame Bracket (see Propeller Shaft Removal in the Final Drive chapter)
  Front Torque Rod Bolt [A], Nut and Washer
  Rear Torque Rod Bolt [B] and Nut
  Left Torque Rod [C]



Right Side

- Remove:
  Muffler (see Muffler Removal in the Engine Top End chapter)
  Front Torque Rod Bolt [A], Nut and Washer
  Rear Torque Rod Bolt [B] and Nut
  Right Torque Rod [C]

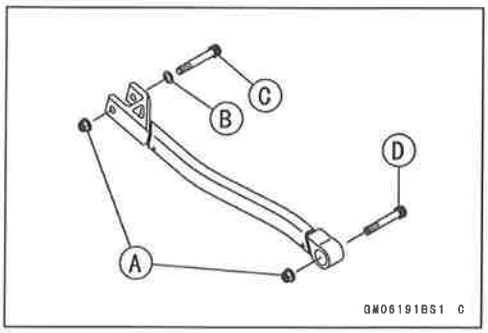


Torque Rod Installation

- Apply grease to the lip of the grease seals.
- Replace the torque rod nuts [A] with new ones.
- Tighten:

Torque - Torque Rod Nuts: 60 N·m (6.1 kgf·m, 44 ft·lb)

Washer [B]
L = 67 mm (2.6 in.) [C]
L = 63 mm (2.5 in.) [D]

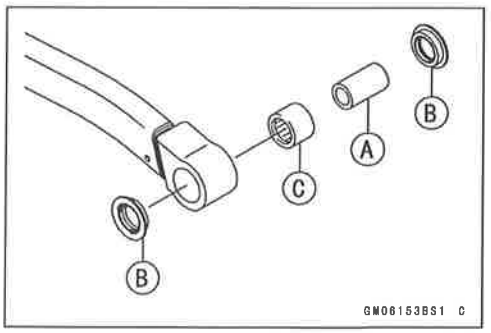


Torque Rod Bearing Removal

- Remove:
  Torque Rod (see Torque Rod Removal)
  Sleeve [A]
  Grease Seals [B]
  Needle Bearing [C]

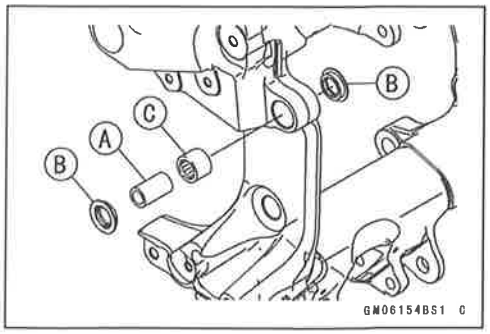
○Hold the torque rod and remove the needle bearing.

Special Tool - Oil Seal & Bearing Remover: 57001-1058



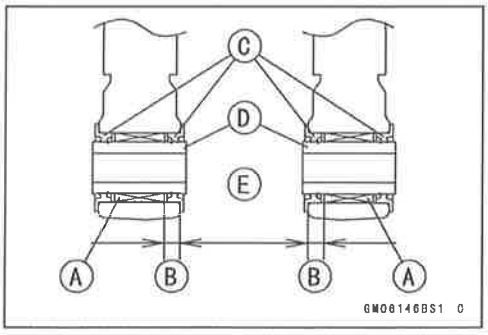
- Remove:
  Sleeve [A]
  Grease Seals [B]
  Needle Bearing [C]

Special Tool - Oil Seal & Bearing Remover: 57001-1058



Swingarm

Torque Rod Bearing Installation



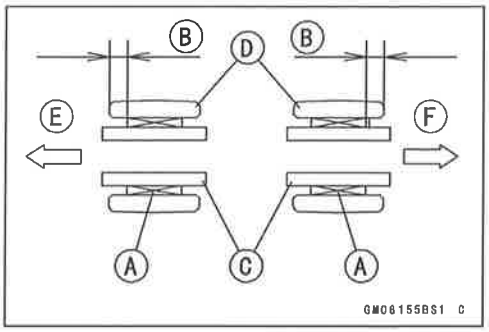
- Replace the needle bearing and grease seal with new ones.

NOTE

○*Install the needle bearing of the torque rod so that the manufacture's marks side faces IN.*

- Install the needle bearing [A] position as shown.
  5.5 ±0.4 mm (0.22 ±0.02 in.) [B]
  Grease Seal [C]
  Sleeve [D]
  Inside [E]

○Apply grease to the lip of the grease seal.



NOTE

○*Install the needle bearing of the frame so that the manufacture's marks side faces OUT.*

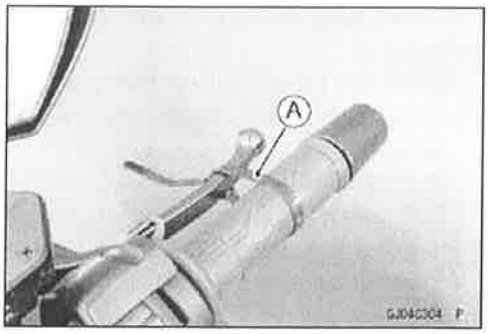
- Install the needle bearing [A] position as shown.
  5.5 ±0.4 mm (0.22 ±0.02 in.) [B]
  Sleeve [C]
  Frame [D]
  Left Side [E]
  Right Side [F]

○Apply grease to the lip of the grease seal.

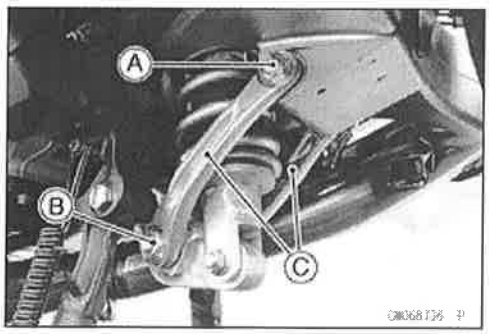
Tie-Rod, Rocker Arm

Tie-Rod Removal

- Use the center stand to support the motorcycle upright.
- Squeeze the brake lever slowly and hold it with a band [A].



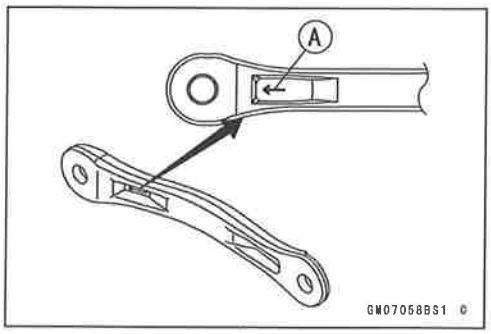
- Remove:
  Upper Tie-Rod Nut and Bolt [A]
  Lower Tie-Rod Nut and Bolt [B]
  Tie-Rods [C]



Tie-Rod Installation

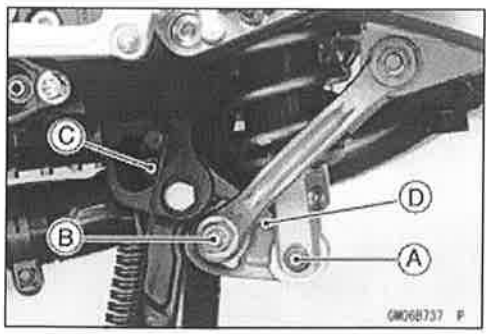
- Apply grease to the inside of the grease seals.
- Install each tie-rod so that the arrow [A] faces forward.
- Replace the tie-rod nuts with new ones.
- Tighten:

Torque - Tie-Rod Nuts: 60 N·m (6.1 kgf·m, 44 ft·lb)



Rocker Arm Removal

- Use the center stand to support the motorcycle upright.
- Squeeze the brake lever slowly and hold it with a band.
- Remove:
  Muffler Body (see Muffler Body Removal in the Engine Top End chapter)
  Lower Rear Shock Absorber Nut and Bolt [A]
  Lower Tie-Rod Nut and Bolt [B]
  Rocker Arm Nut and Bolt [C]
  Rocker Arm [D]



Rocker Arm Installation

- Apply grease to the inside of the grease seals.
- Replace:
  Rocker Arm Nut
  Tie-Rod Nut
  Rear Shock Absorber Nut (Lower)
- Tighten:

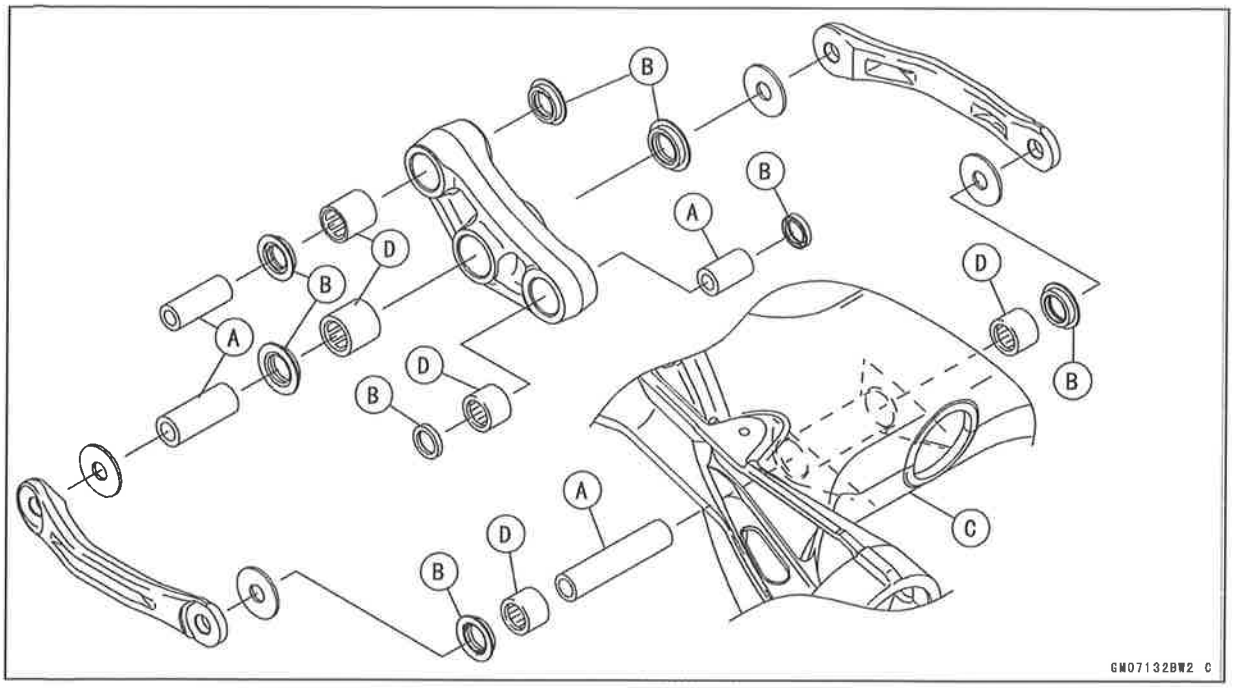
Torque - Rocker Arm Nut: 50 N·m (5.1 kgf·m, 37 ft·lb)
Tie-Rod Nut: 60 N·m (6.1 kgf·m, 44 ft·lb)
Rear Shock Absorber Nut (Lower): 35 N·m (3.6 kgf·m, 26 ft·lb)

Tie-Rod, Rocker Arm

Tie-Rod and Rocker Arm Bearing Removal

- Remove:
  Tie-Rods (see Tie-Rod Removal)
  Rocker Arm (see Rocker Arm Removal)
  Sleeves [A]
  Grease Seals [B]
  Swingarm [C] (see Swingarm Removal)
- Remove the needle bearings [D], using the bearing remover head and bearing remover shaft.

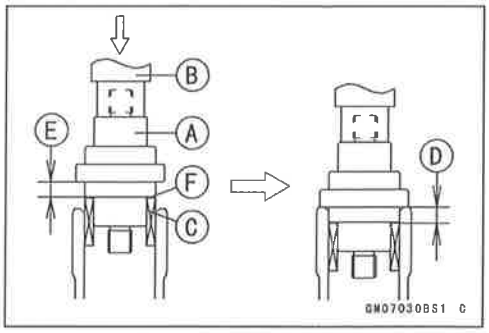
Special Tools - Bearing Remover Head, ϕ20 × ϕ22: 57001-1293
Bearing Remover Shaft, ϕ13: 57001-1377



Tie-Rod and Rocker Arm Bearing Installation

- Replace the needle bearing and grease seals with new ones.
- Apply plenty of grease to the lips of the grease seals.
- Install the needle bearings and grease seals position as shown in the figure.

Tie-Rod, Rocker Arm



○Screw the needle bearing driver [A] into the driver holder [B].
○Insert the needle bearing driver into the needle bearing [C] and press the needle bearing into the housing until the driver contacts the end surface of the housing.
Bearing Pressing Depth: 5.5 mm (0.22 in.) [D]
5.0 mm (0.20 in.) [E]

NOTE

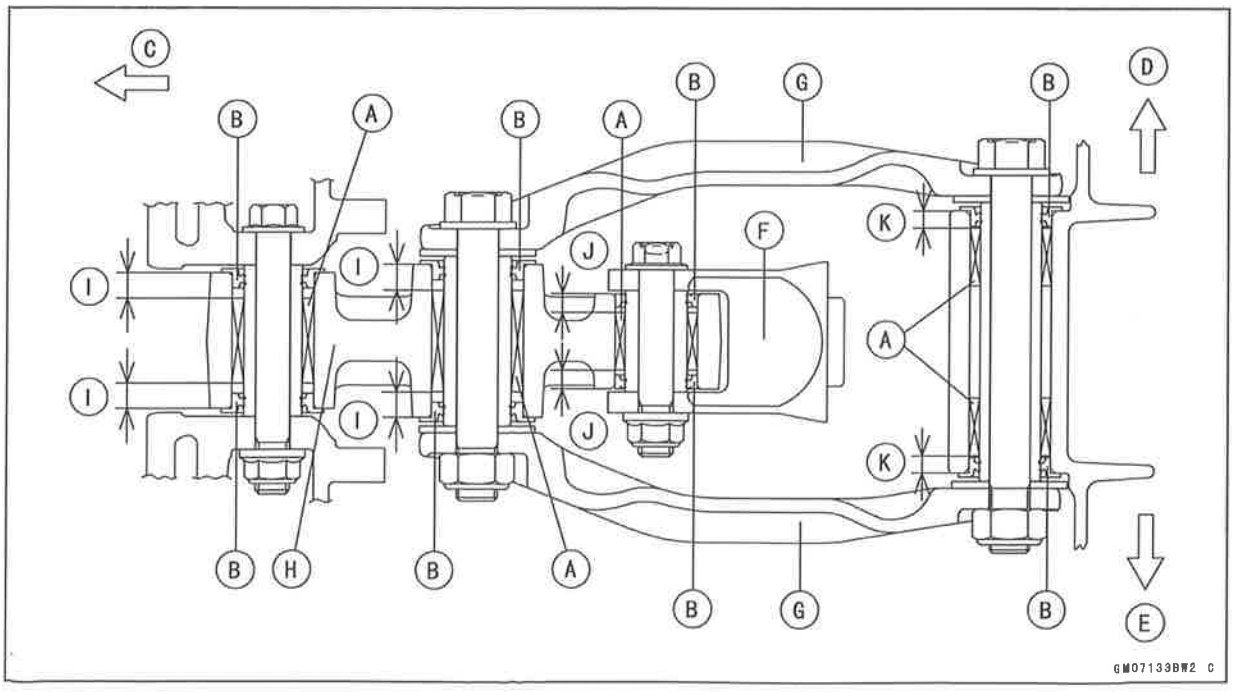
○*For a bearing of inner diameter ϕ18, select the pressing side of the needle bearing driver according to its pressing depth.*

Special Tools - Bearing Driver Set: 57001-1129
Needle Bearing Driver, ϕ17/ϕ18: 57001-1609
Spacer, ϕ18 [F]: 57001-1636
Needle Bearing Driver, ϕ20 & Spacer, ϕ28: 57001-1678

NOTE

○*Install the needle bearings so that the marked side faces in.*

Needle Bearing [A]
Oil Seals [B]
Front [C]
Right Side [D]
Left Side [E]
Rear Shock Absorber [F]
Tie-Rods [G]
Rocker Arm [H]
7.5 ±0.4 mm (0.30 ±0.02 in.) [I]
5.5 ±0.4 mm (0.22 ±0.02 in.) [J]
5.0 ±0.4 mm (0.20 ±0.02 in.) [K]

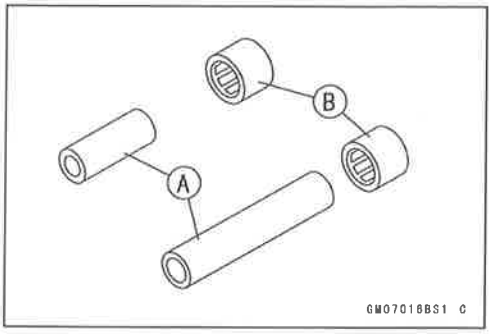


Tie-Rod, Rocker Arm

Rocker Arm/Tie-Rod Bearing, Sleeve Inspection

NOTICE

Do not remove the bearings for inspection. Removal may damage them.



- Visually inspect the locker arm, or tie-rod sleeves [A] and needle bearings [B].
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of any of the needle bearings or sleeve, replace the sleeve and needle bearings as a set.

Rocker Arm/Tie-Rod Bearing Lubrication

NOTE

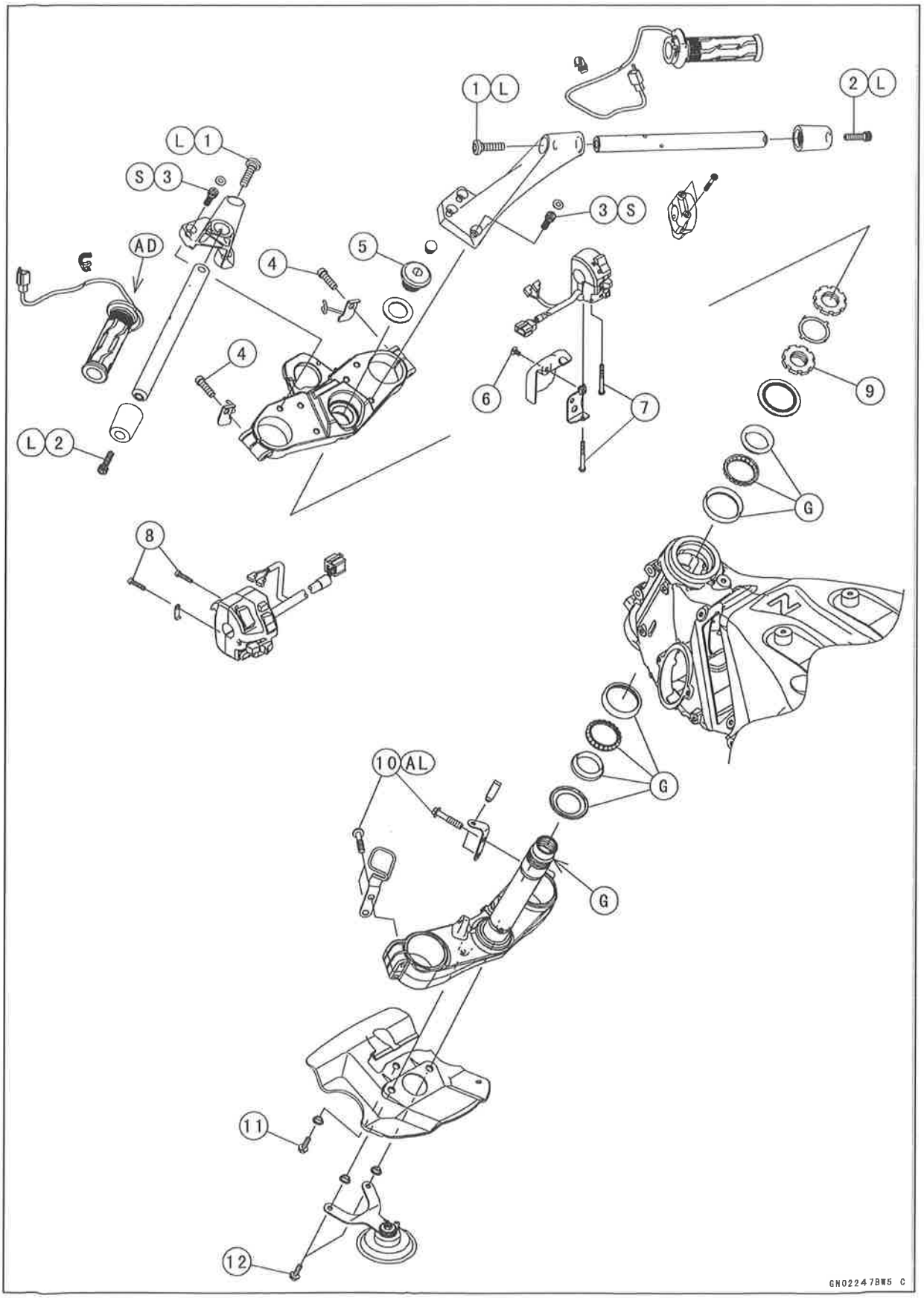
○*Since the bearings are packed with grease, lubrication is not required.*

Steering

Table of Contents

Exploded View 14-2
Special Tools and Sealant 14-4
Steering 14-5
  Steering Inspection 14-5
  Steering Adjustment 14-5
Steering Stem 14-6
  Stem, Stem Bearing Removal 14-6
  Stem, Stem Bearing Installation 14-8
  Steering Stem Bearing Lubrication 14-9
  Steering Stem Warp Inspection 14-9
  Stem Cap Deterioration, Damage Inspection 14-10
Handlebar 14-11
  Handlebar Removal 14-11
  Handlebar Installation 14-11
  Handlebar Holder Removal 14-12
  Handlebar Holder Installation 14-12

Exploded View



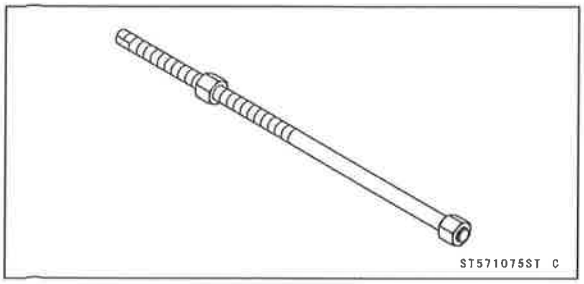
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Handlebar Bolts	35	3.6	26	L
2	Handlebar Weight Bolts	20	2.0	15	L
3	Handlebar Holder Bolts	25	2.5	18	S
4	Front Fork Clamp Bolts (Upper)	20	2.0	15	
5	Steering Stem Head Bolt	110	11.2	81.1	
6	Throttle Case Cover Screw	3.0	0.31	27 in·lb	
7	Right Handlebar Switch Housing Screws	3.5	0.36	31 in·lb	
8	Left Handlebar Switch Housing Screws	3.5	0.36	31 in·lb	
9	Steering Stem Nut	30	3.1	22	
10	Front Fork Clamp Bolts (Lower)	30	3.1	22	AL
11	Steering Stem Cover Bolt	8.0	0.82	71 in·lb	
12	Horn Bolts	8.0	0.82	71 in·lb	

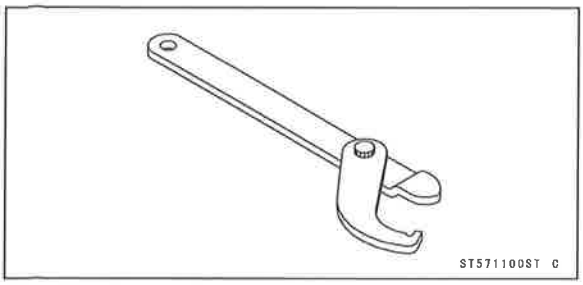
AD: Apply adhesive.
AL: Tighten the two clamp bolts alternately two time to ensure even tightening.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.

Special Tools and Sealant

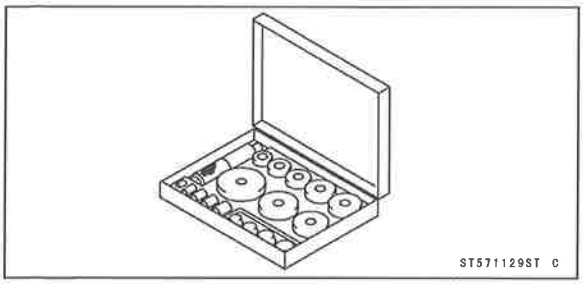
Head Pipe Outer Race Press Shaft:
57001-1075



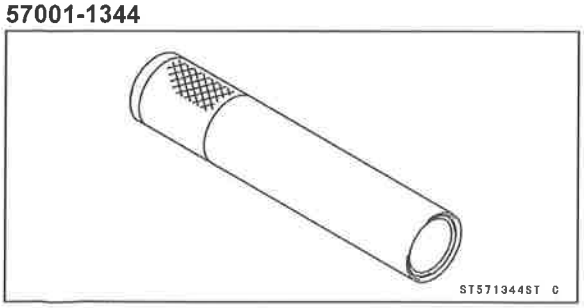
Steering Stem Nut Wrench:
57001-1100



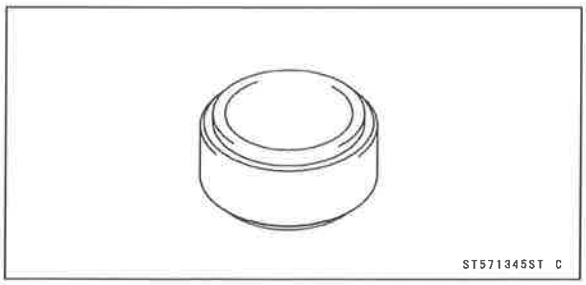
Bearing Driver Set:
57001-1129



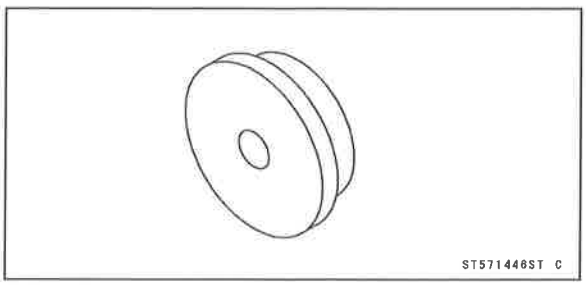
Steering Stem Bearing Driver, ϕ42.5:
57001-1344



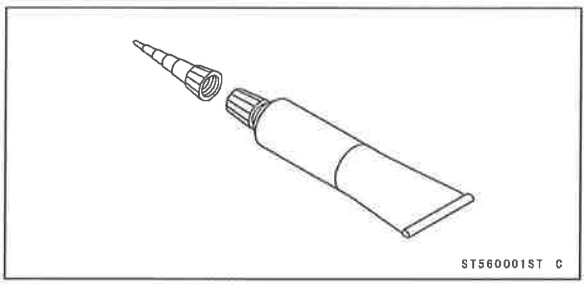
Steering Stem Bearing Driver Adapter, ϕ41.5:
57001-1345



Head Pipe Outer Race Driver, ϕ55:
57001-1446



Adhesive, TB1530C:
56042-0001



Steering

Steering Inspection

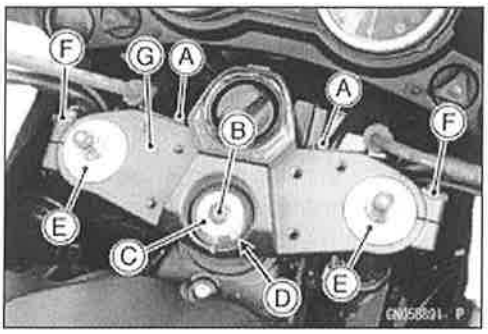
- Refer to the Steering Play Inspection in the Periodic Maintenance chapter.

Steering Adjustment

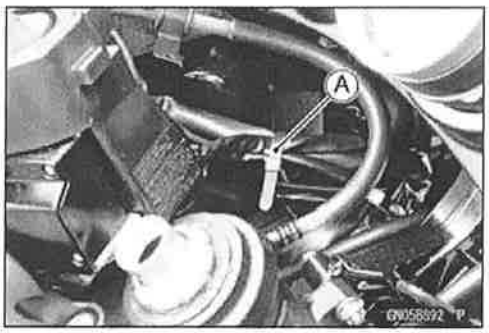
- Refer to the Steering Play Adjustment in the Periodic Maintenance chapter.

Steering Stem

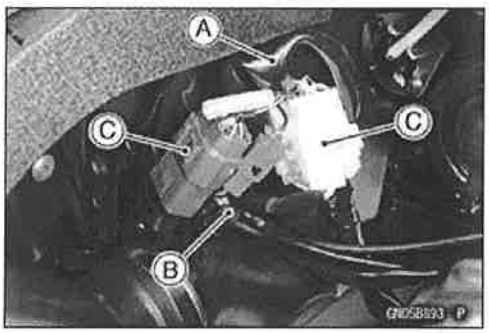
Stem, Stem Bearing Removal



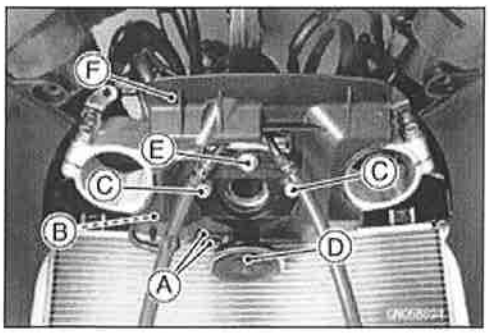
- Remove:
  Handlebar Holders with Handlebar Assemblies (see Handlebar Holder Removal)
  Bolts [A]
  Cap [B]
  Steering Stem Head Bolt [C] and Washer [D]
  Front Forks [E] (see Front Fork Removal in the Suspension chapter)
- Free the leads and cables from the guides [F].
- Remove the steering stem head [G].



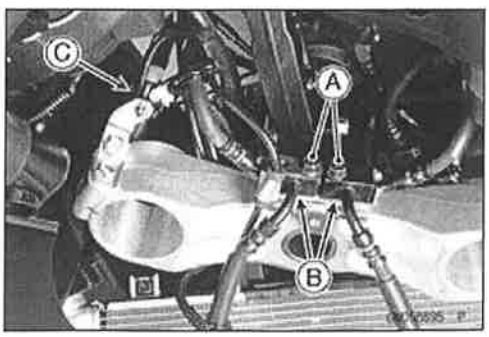
- Remove the band [A].



- Slide the dust cover [A].
- Open the clamp [B].
- Disconnect the steering lock unit lead connectors [C].



- Remove:
  Upper Inner Fairing (see Upper Inner Fairing Removal in the Frame chapter)
- Disconnect the horn lead connectors [A].
- Remove:
  Clamp [B]
  Horn Bolts [C]
  Horn Bracket with Horn [D]
  Steering Stem Cover Bolt [E]
  Steering Stem Cover [F]



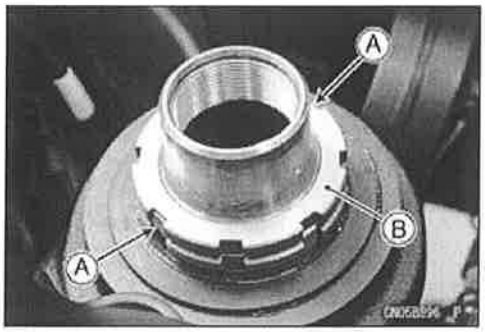
- Remove:
  Brake Hose Joint Bolts [A]
  Front Brake Fittings [B]
- Open the clamp [C].

Steering Stem

- Bend the claws [A] of claw washer straighten.
- Remove the steering stem locknut [B].

Special Tool - Steering Stem Nut Wrench: 57001-1100

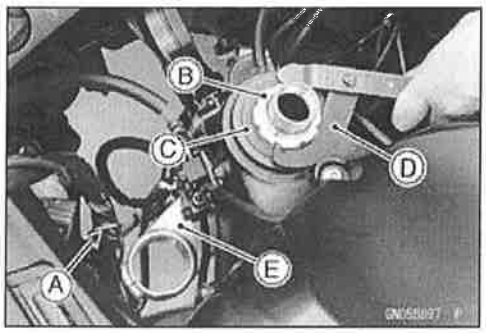
- Remove the claw washer.



- Free the leads from the guide [A].
- Pushing up the stem base, and remove the steering stem nut [B] and stem cap [C].

Special Tool - Steering Stem Nut Wrench [D]: 57001-1100

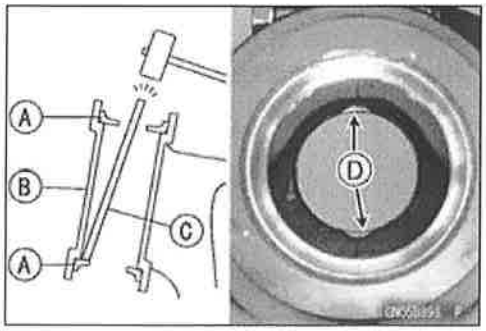
- Remove:
  Steering Stem [E]
  Upper Ball Bearing Inner Race and Ball Bearing



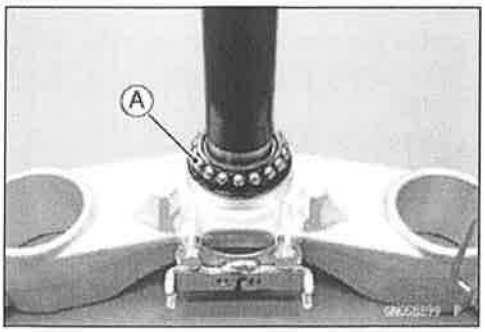
- To remove the bearing outer races [A] pressed into the head pipe [B], insert a bar [C] into the recesses [D] of head pipe, and applying it to both recess alternately hammer it to drive the race out.

NOTE

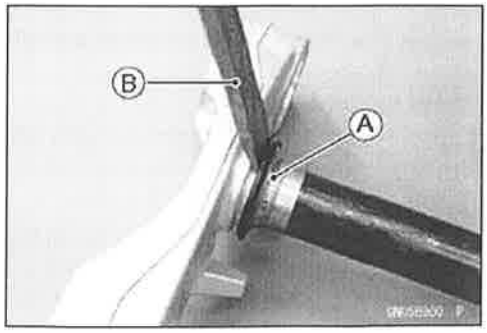
○*If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.*



- Remove the bearing [A] from the steering stem.



- Remove the lower ball bearing inner race (with its oil seal) [A] which is pressed onto the steering stem with a suitable commercially available chisel [B].



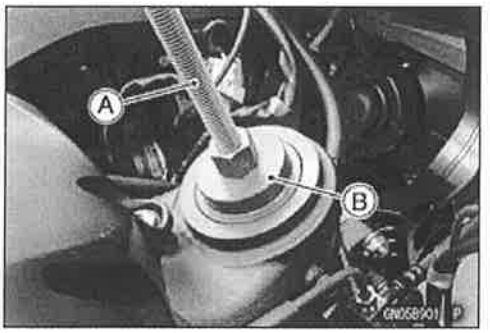
Steering Stem

Stem, Stem Bearing Installation

- Replace the bearing outer races with new ones.
- Drive them into the head pipe at the same time.

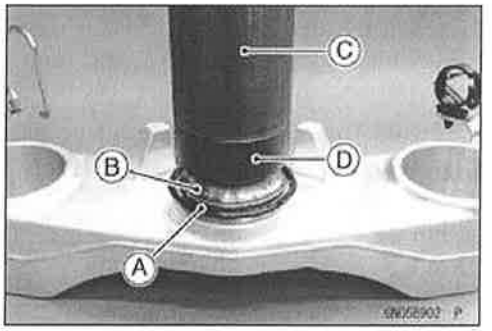
Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-1075
Bearing Driver Set: 57001-1129
Head Pipe Outer Race Driver, ϕ55 [B]: 57001-1446

- Apply grease to the outer races.



- Replace the bearing inner races and oil seal with new ones.
- Apply grease to the oil seal.
- Install the oil seal [A] on the steering stem, and drive the lower ball bearing inner race [B] applied the grease onto the stem.

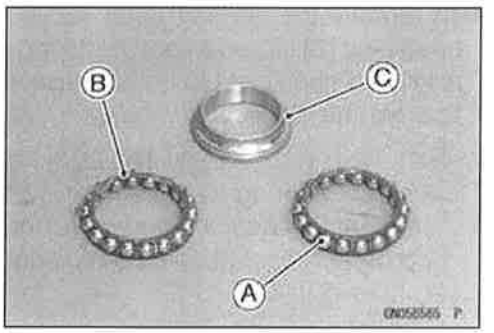
Special Tools - Steering Stem Bearing Driver, ϕ42.5 [C]: 57001-1344
Steering Stem Bearing Driver Adapter, ϕ41.5 [D]: 57001-1345



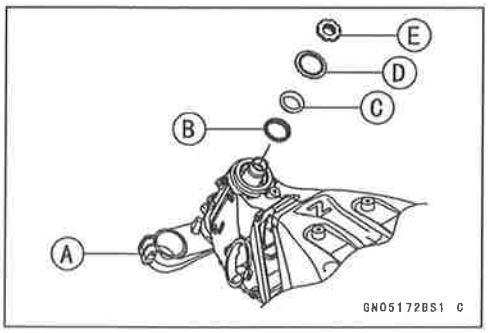
- Apply grease to the lower bearing [A], and install it onto the steering stem.

○The upper and lower bearings are identical.

- Apply grease to the upper bearing [B] and inner race [C].



- Install the stem [A] through the head pipe and install the ball bearing [B] and inner race [C] on it.
- Install:
  Stem Cap [D]
  Steering Stem Nut [E]



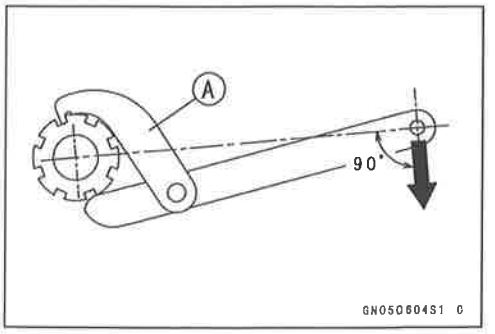
- Settle the inner races in place as follows.
- Apply grease to the thread of the steering stem nut and stem locknut.

○Tighten the steering stem nut with **65 N·m (6.6 kgf·m, 48 ft·lb)** of torque first, and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using a stem nut wrench [A] in the direction shown.

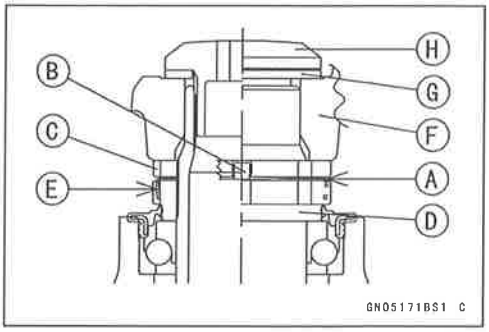
○Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.

Special Tool - Steering Stem Nut Wrench: 57001-1100

Torque - Steering Stem Nut: 30 N·m (3.1 kgf·m, 22 ft·lb)



Steering Stem



- Install the claw washer [A] so that its bent side [B] faces upward, and engage the bent claws with the grooves of the steering stem locknut [C].
- Tighten the stem locknut by hand until the claw washer touches the steering stem nut [D].
- Tighten the stem locknut again until the claws are aligned with the grooves (ranging from 2nd to 4th) of the stem nut, and bend the two claws downward [E].
- Install the steering stem head [F].
- Install the washer [G], and tighten the steering stem head bolt [H] temporarily.
- Install the front forks (see Front Fork Installation in the Suspension chapter).

NOTE

○*Tighten the upper front fork clamp bolts first, next the steering stem head bolt, last the lower front fork clamp bolts.*

○*Tighten the two lower front fork clamp bolts alternately two times to ensure even tightening torque.*

Torque - Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 15 ft·lb)
Steering Stem Head Bolt: 110 N·m (11.2 kgf·m, 81.1 ft·lb)
Front Fork Clamp Bolts (Lower): 30 N·m (3.1 kgf·m, 22 ft·lb)

⚠ WARNING

If the handlebar does not turn to the steering stop it may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section in the Appendix chapter).

- Install the plug on the steering stem head bolt.
- Install the removed parts (see appropriate chapters).

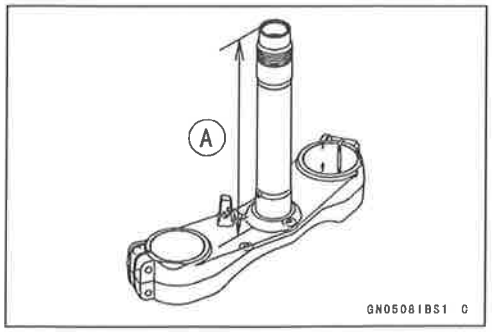
Steering Stem Bearing Lubrication

- Refer to the Steering Stem Bearing Lubrication in the Periodic Maintenance chapter.

Steering Stem Warp Inspection

- Whenever the steering stem is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness.

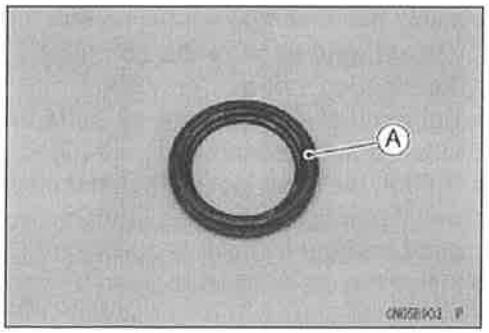
★If the steering stem [A] is bent, replace the steering stem.



Steering Stem

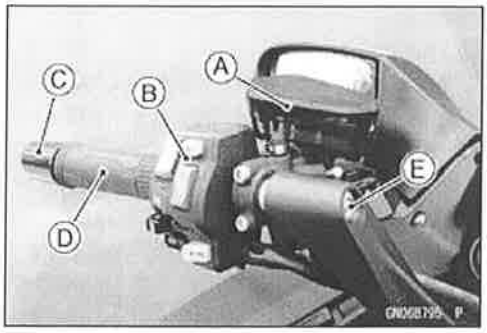
Stem Cap Deterioration, Damage Inspection

★Replace the stem cap if its oil seal [A] shows damage.

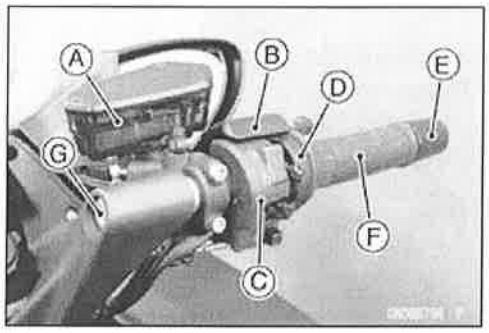


Handlebar

Handlebar Removal

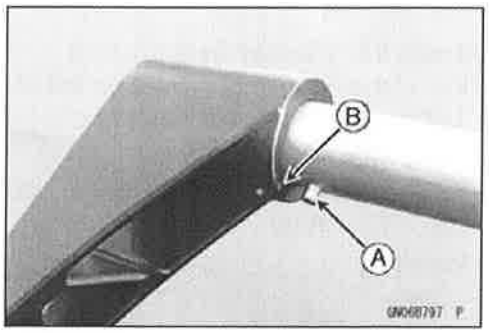


- Remove:
  Clutch Master Cylinder [A] (see Clutch Master Cylinder Removal in the Clutch chapter)
  Left Handlebar Switch Housing [B]
  Handlebar Weight [C]
  Left Handlebar Grip (Grip Warmer) [D]
  Handlebar Bolt [E]
  Left Handlebar



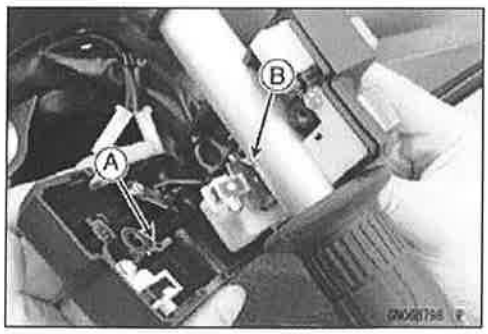
- Remove:
  Front Brake Master Cylinder [A] (see Front Brake Master Cylinder Removal in the Brakes chapter)
  Throttle Case Cover [B]
  Right Handlebar Switch Housing [C]
  Throttle Case [D]
  Handlebar Weight [E]
  Throttle Grip (Grip Warmer) [F]
  Handlebar Bolt [G]
  Right Handlebar

Handlebar Installation



- Fit the pin [A] of the handlebar to the recess [B] of the handlebar holder.
- Apply a non-permanent locking agent to the threads of the handlebar bolts.
- Tighten:

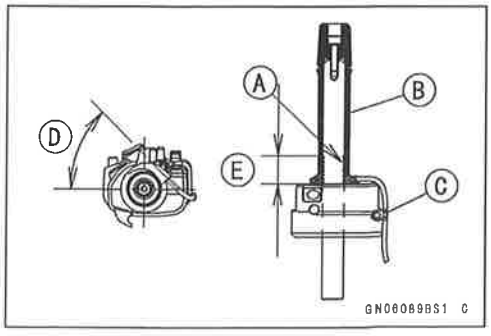
Torque - Handlebar Bolts: 35 N·m (3.6 kgf·m, 26 ft·lb)



- Install the left and right handlebar switch housings.

○Fit the projection [A] into a small hole [B] in the handlebar.

Torque - Handlebar Switch Housing Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)



- Apply adhesive [A] to the inside of the left handlebar grip [B].

Sealant - Adhesive, TB1530C: 56042-0001

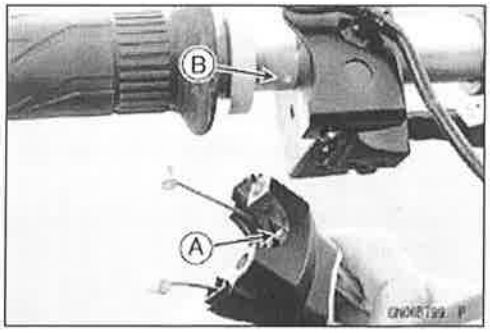
- Insert the left handlebar grip in the handlebar so that the grip fits the handlebar switch housing.
  Clamp [C]
  45° [D]
  30 mm (1.2 in) or more [E]

Handlebar

- Install:
  Throttle Grip
  Throttle Case with Throttle Cable

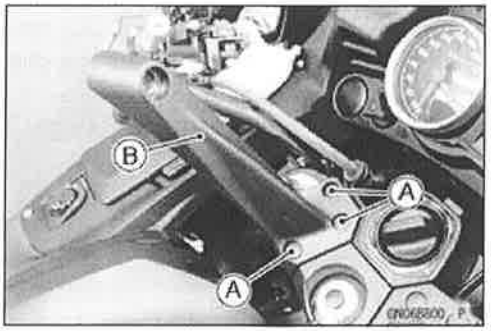
○Fit the projection [A] into a small hole [B] in the handlebar.

- Install:
  Clutch Master Cylinder (see Clutch Master Cylinder Installation in the Clutch chapter)
  Front Brake Master Cylinder (see Front Brake Master Cylinder Installation in the Brakes chapter)
- Apply a non-permanent locking agent to the threads of the handlebar weight bolts, and tighten them.



Handlebar Holder Removal

- Remove:
  Left and Right Handlebar (see Handlebar Removal)
  Caps [A] and Handlebar Holder Bolts
  Handlebar Holder [B]

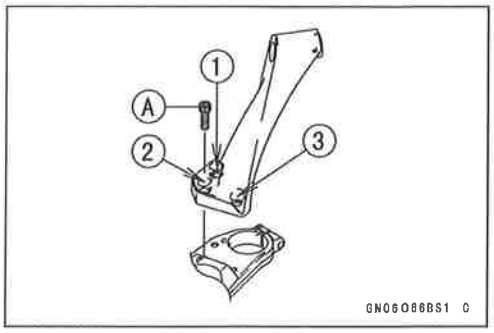


Handlebar Holder Installation

- Install the handlebar holder on the steering stem head.
- Tighten the handlebar holder bolts [A] following the tightening sequence [1-2-3-1].

Torque - Handlebar Holder Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Install:
  Caps
  Left and Right Handlebar (see Handlebar Installation)

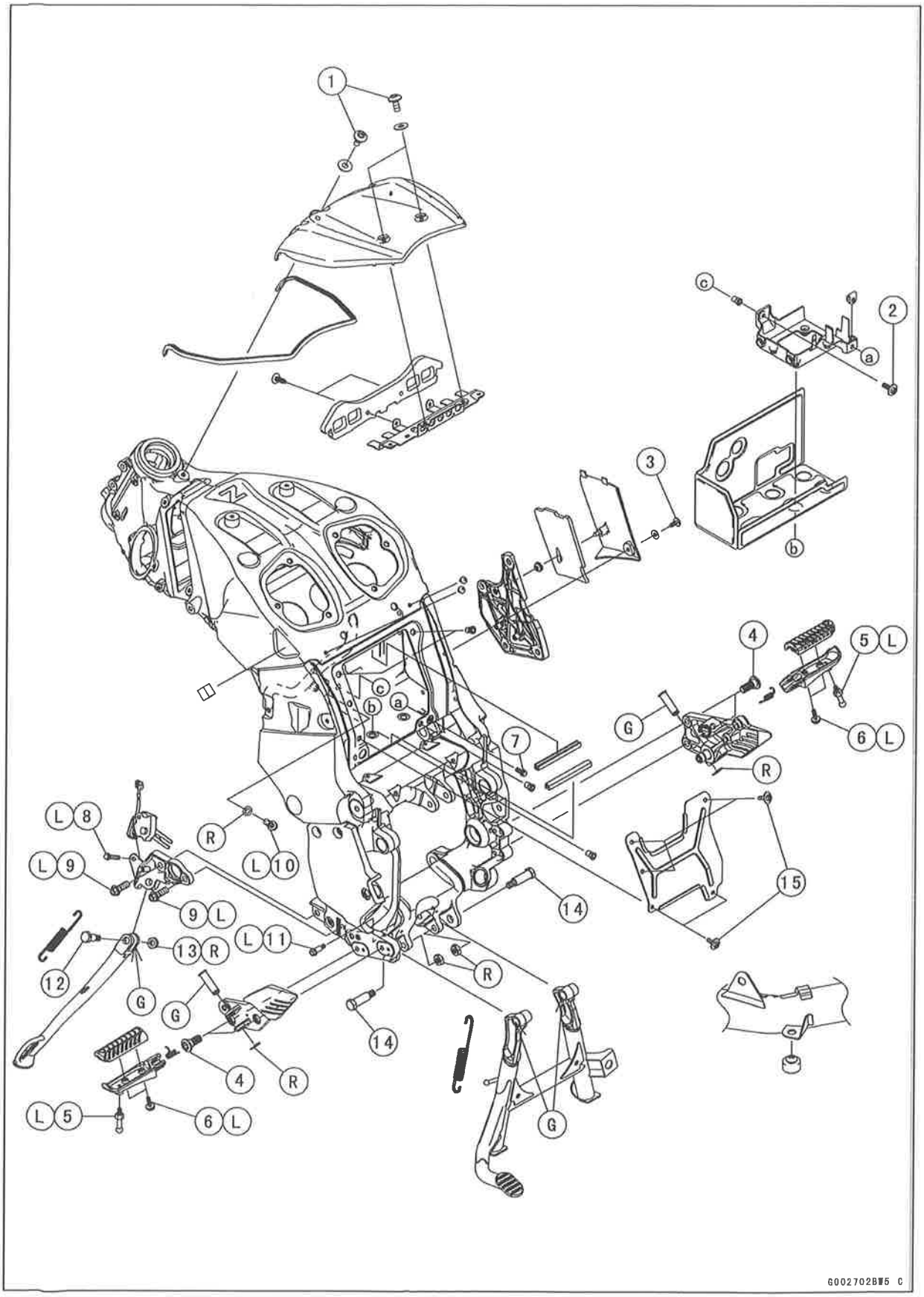


Frame

Table of Contents

Exploded View 15-2
Special Tools 15-12
Seat 15-13
  Seat Removal 15-13
  Seat Installation 15-13
Fairings 15-14
  Lower Fairing Removal 15-14
  Lower Fairing Installation 15-15
  Rear Middle Fairing Removal 15-16
  Rear Middle Fairing Installation ... 15-17
  Front Middle Fairing Removal 15-19
  Front Middle Fairing Installation ... 15-20
  Front Middle Fairing Disassembly 15-21
  Front Middle Fairing Assembly 15-21
  Upper Fairing Removal 15-21
  Upper Fairing Installation 15-23
  Upper Fairing Disassembly 15-24
  Upper Fairing Assembly 15-24
  Upper Inner Fairing Removal 15-24
  Upper Inner Fairing Installation 15-24
  Left Fairing Stay Removal 15-25
  Right Fairing Stay Removal 15-25
  Fairing Stay Installation 15-26
  Upper Fairing Bracket Removal ... 15-26
  Upper Fairing Bracket Installation 15-26
Seat Cover 15-27
  Seat Cover Removal 15-27
  Seat Cover Installation 15-27
  Tail Cover Removal 15-28
  Tail Cover Installation 15-29
Fenders 15-30
  Front Fender Removal 15-30
  Front Fender Installation 15-30
  Flap and Rear Fender Removal ... 15-30
  Flap and Rear Fender Installation 15-32
Windshield 15-33
  Windshield Removal 15-33
  Windshield Installation 15-33
Frame 15-34
  Rear Frame Removal 15-34
  Rear Frame Installation 15-34
  Left Subframe Removal 15-34
  Right Subframe Removal 15-35
  Subframe Installation 15-35
  Frame Inspection 15-35
Cover 15-36
  Front Fuel Tank Cover Removal .. 15-36
  Front Fuel Tank Cover Installation 15-36
  Inner Cover Removal 15-36
  Inner Cover Installation 15-38
  Left Inner Rubber Cover Removal 15-40
  Left Inner Rubber Cover Installation 15-40
  Right Inner Rubber Cover Removal 15-40
  Right Inner Rubber Cover Installation 15-41
  Meter Cover Removal 15-41
  Meter Cover Installation 15-42
Center Stand, Side Stand 15-43
  Center Stand Removal 15-43
  Center Stand Installation 15-43
  Side Stand Removal 15-43
  Side Stand Installation 15-44
Saddlebag (Accessory) 15-45
  Saddlebag Removal 15-45
  Saddlebag Installation 15-45
  Saddlebag Disassembly 15-45
  Saddlebag Assembly 15-46
Carrier 15-47
  Carrier Removal 15-47
  Carrier Installation 15-47
Rear View Mirror 15-48
  Rear View Mirror Removal 15-48
  Rear View Mirror Installation 15-48
Pads 15-50

Exploded View

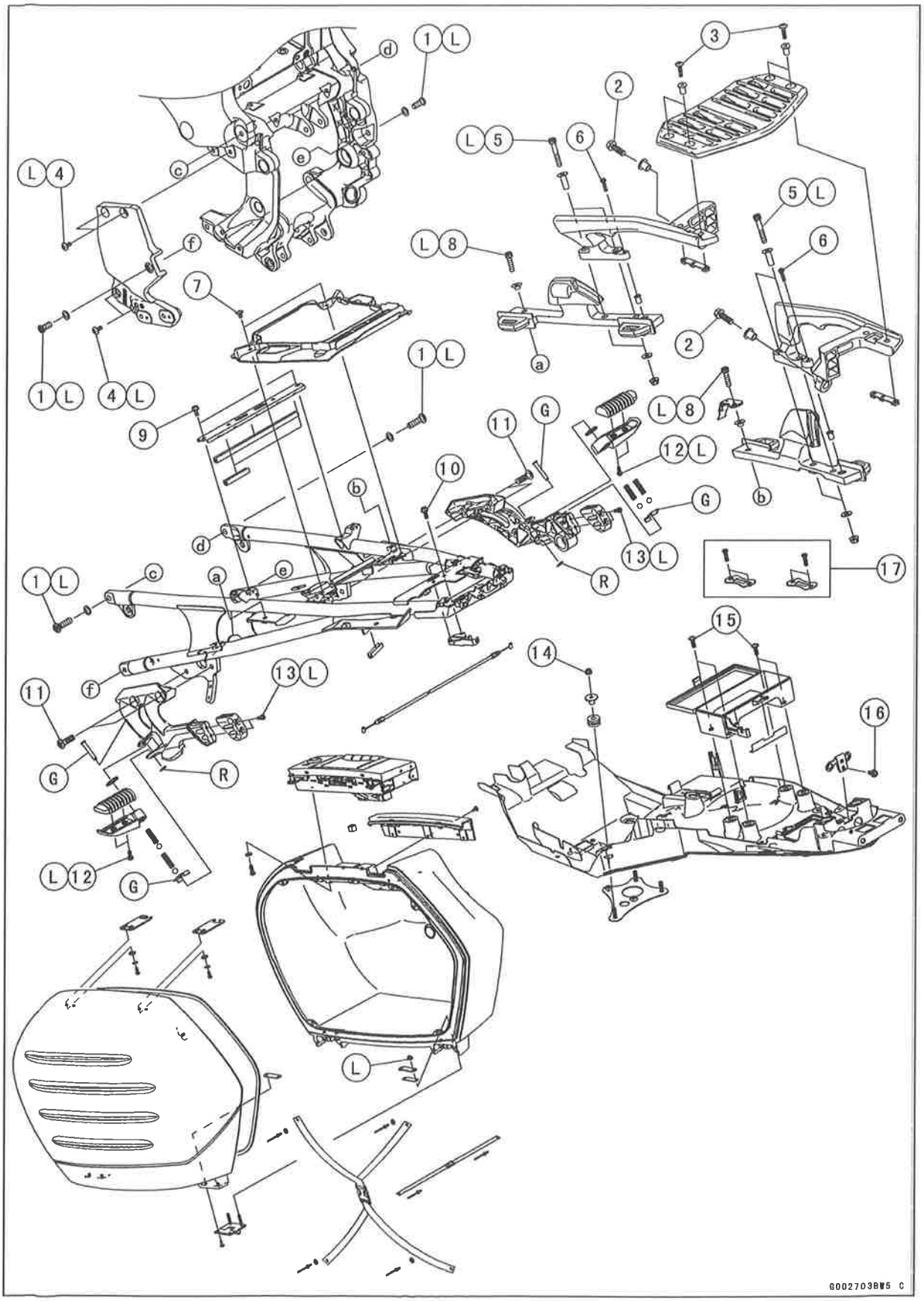


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fuel Tank Cover Bolts	4.0	0.41	35 in·lb	
2	Battery Case Holder Bolt (L= 22 mm)	4.0	0.41	35 in·lb	
3	Right Cover Bolt	4.0	0.41	35 in·lb	
4	Front Footpeg Bracket Bolts	25	2.5	18	
5	Bank Sensors	8.0	0.82	71 in·lb	L
6	Front Footpeg Screws	3.0	0.31	27 in·lb	L
7	Battery Case Holder Bolt (L= 14 mm)	4.0	0.41	35 in·lb	
8	Side Stand Switch Bolt	9.0	0.92	80 in·lb	L
9	Side Stand Bracket Bolts	50	5.1	37	L
10	Breather Pipe Bolt	8.0	0.82	71 in·lb	L
11	Center Stand Spring Bolt	8.0	0.82	71 in·lb	L
12	Side Stand Bolt	45	4.6	33	
13	Side Stand Nut	45	4.6	33	R
14	Center Stand Bolts	45	4.6	33	
15	Battery Back Cover Bolts	8.0	0.82	71 in·lb	

G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Exploded View



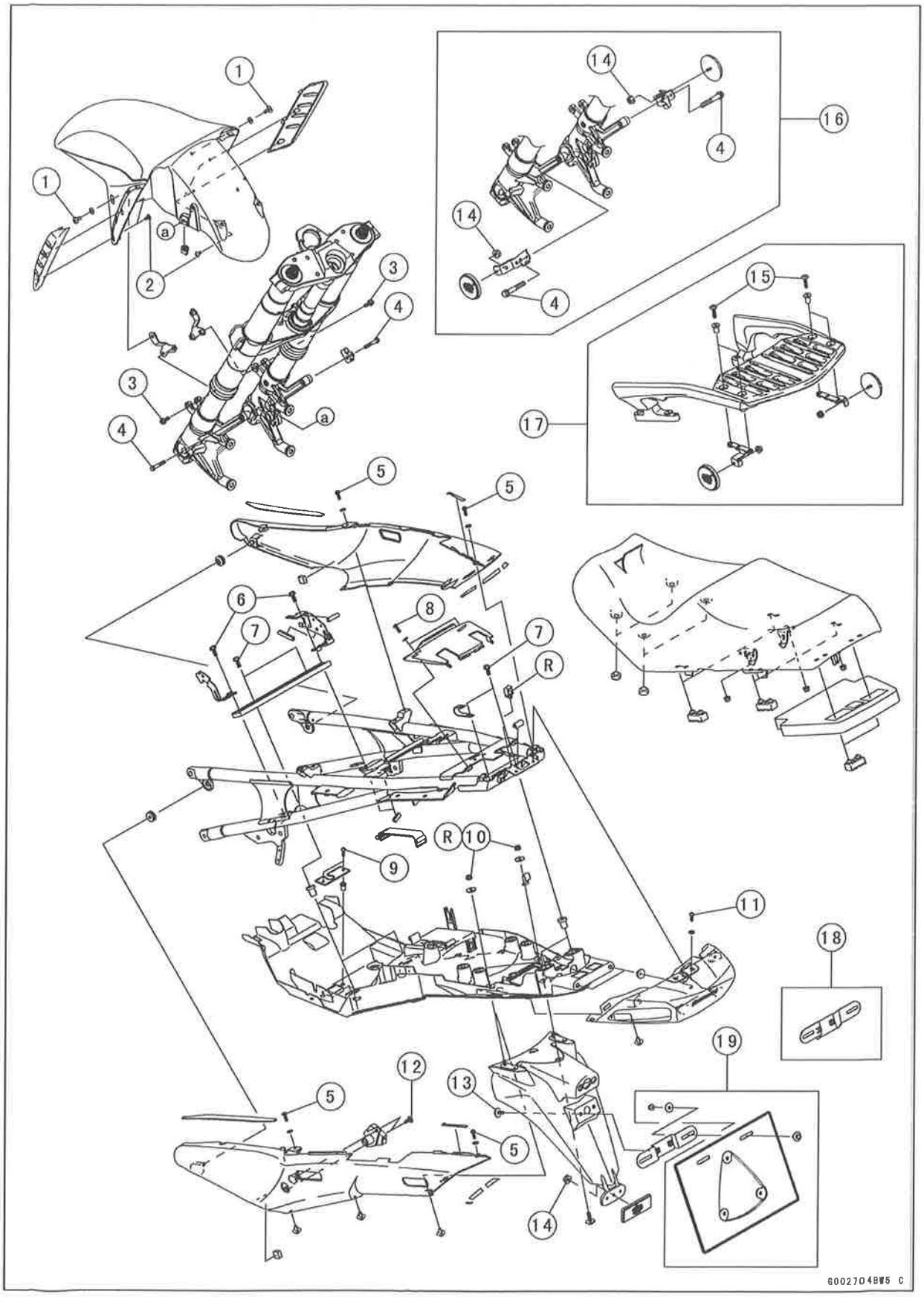
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Frame Bolts	45	4.6	33	L
2	Carrier Bracket Bolts (M10)	35	3.6	26	
3	Carrier Plate Bolts	8.0	0.82	71 in·lb	
4	Frame Side Bracket Bolts	25	2.5	18	L
5	Carrier Bracket Bolts (M8)	25	2.5	18	L
6	Carrier Bracket Bolts (M5)	0.50	0.05	4.4 in·lb	
7	Seat Under Plate Bolts	4.0	0.41	35 in·lb	
8	Hook Bracket Bolts	25	2.5	18	L
9	Fuel Tank Bracket Bolts	8.0	0.82	71 in·lb	
10	Seat Lock Latch Bolts	8.0	0.82	71 in·lb	
11	Rear Footpeg Bracket Bolts	35	3.6	26	
12	Rear Footpeg Screws	3.0	0.31	27 in·lb	L
13	Rear Footpeg Bracket Cap Bolt	1.2	0.12	11 in·lb	L
14	Regulator/Rectifier Bracket Nuts	7.0	0.71	62 in·lb	
15	Tool Kit Case Bolts	4.0	0.41	35 in·lb	
16	Vehicle-down Sensor Bracket Bolt	4.0	0.41	35 in·lb	

17. ECU Guard Equipped Models

G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Exploded View



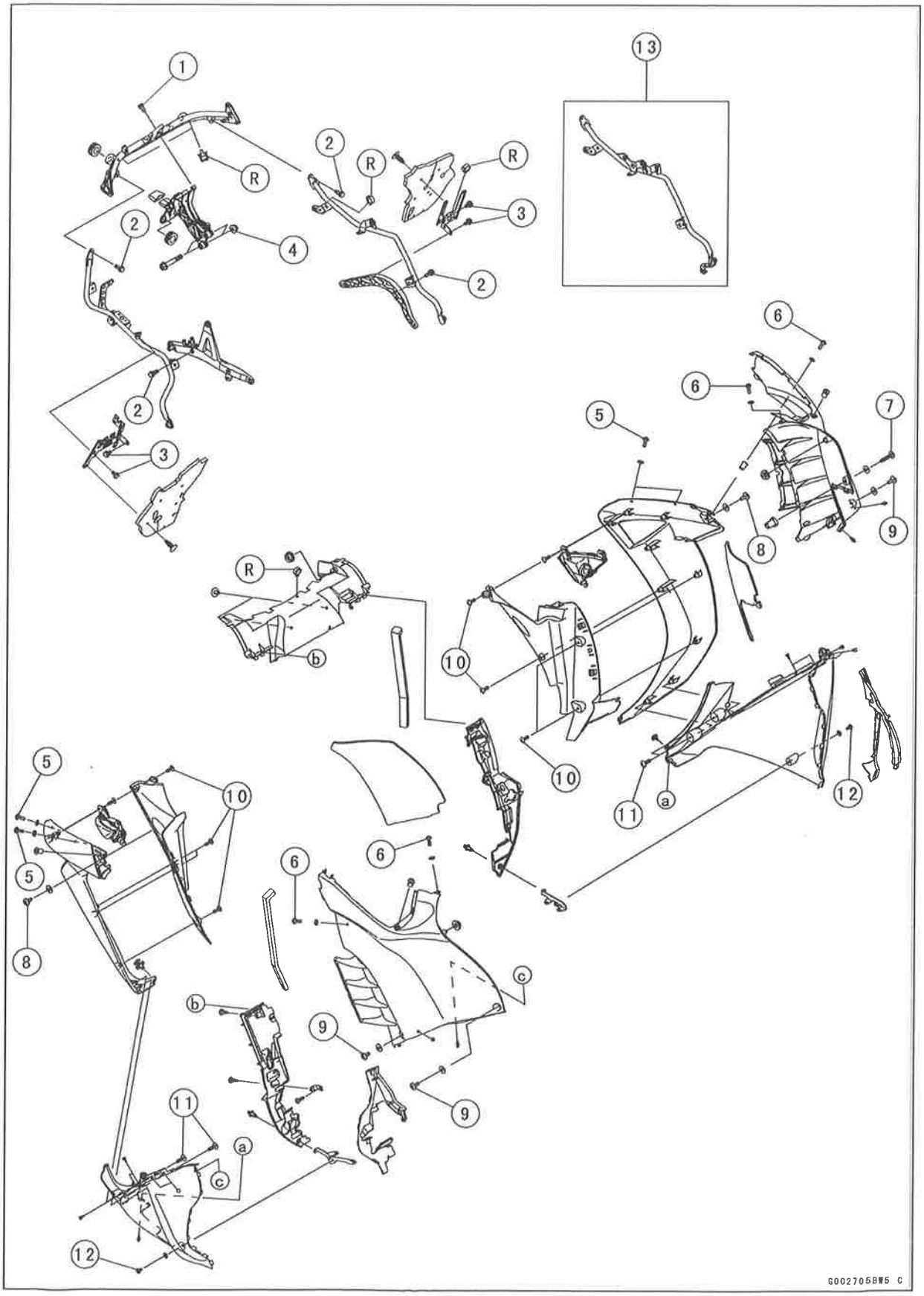
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fender Mounting Bolts (L = 14 mm)	4.0	0.41	35 in·lb	
2	Front Fender Cover Screws	1.2	0.12	11 in·lb	
3	Front Fender Bracket Bolts	8.0	0.82	71 in·lb	
4	Front Fender Mounting Bolts (L = 35 mm)	4.0	0.41	35 in·lb	
5	Seat Cover Bolts	3.0	0.31	27 in·lb	
6	Cross Bar Bolts	8.0	0.82	71 in·lb	
7	Rear Fender Mounting Bolts	1.0	0.10	8.9 in·lb	
8	Center Seat Cover Bolts	3.0	0.31	27 in·lb	
9	Lead Cover Bolts	1.0	0.10	8.9 in·lb	
10	Flap Mounting Nuts	4.0	0.41	35 in·lb	R
11	Tail Cover Bolts	3.0	0.31	27 in·lb	
12	Seat Lock Screws	1.2	0.12	11 in·lb	
13	License Plate Bracket Bolts	4.0	0.41	35 in·lb	
14	Reflector Nuts	3.0	0.31	27 in·lb	
15	Carrier Plate Bolts	8.0	0.82	71 in·lb	

16. AU, CA and US Models
17. CA and US Models
18. CA and US Models
19. AU Model of the ZG1400EF

R: Replacement Parts

Exploded View

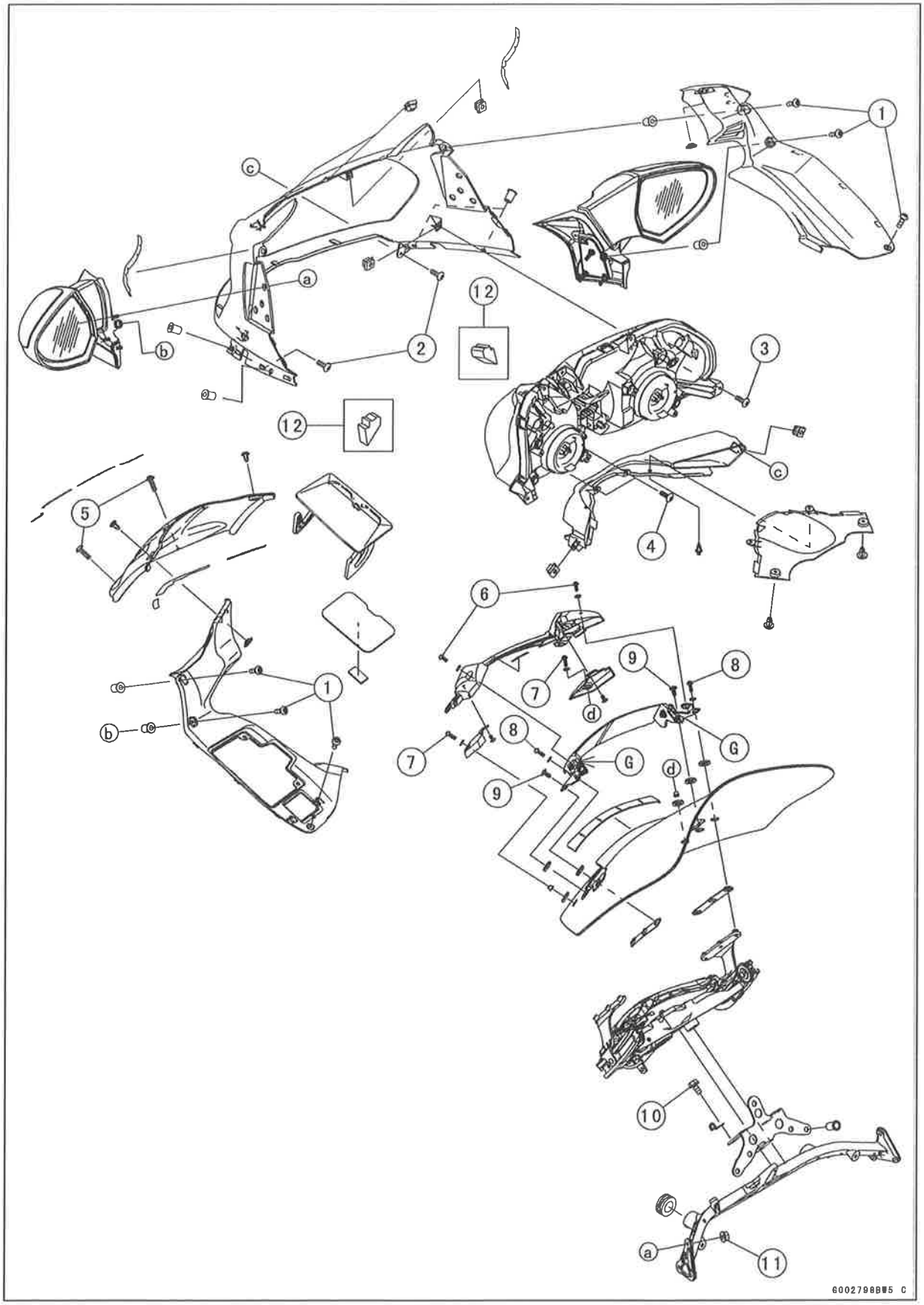


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear View Mirror Bracket Bolts	8.0	0.82	71 in·lb	
2	Fairing Stay Bolts	7.0	0.71	62 in·lb	
3	Pad Bracket Bolts	8.0	0.82	71 in·lb	
4	Upper Fairing Bracket Nuts	25	2.5	18	R
5	Front Middle Fairing Bolts (M5)	0.50	0.05	4.4 in·lb	
6	Rear Middle Fairing Bolts (M5)	0.50	0.05	4.4 in·lb	
7	Rear Middle Fairing Bolt (M6, L = 30 mm)	1.0	0.10	8.9 in·lb	
8	Front Middle Fairing Bolts (M6)	4.0	0.41	35 in·lb	
9	Rear Middle Fairing Bolts (M6, L= 14 mm)	4.0	0.41	35 in·lb	
10	Front Middle Fairing Inner Cover Screws	3.0	0.31	27 in·lb	
11	Lower Fairing Screws	3.0	0.31	27 in·lb	
12	Lower Fairing Bolts	4.0	0.41	35 in·lb	

13. CAL, CN, SEA-B1 and TH Models

Exploded View



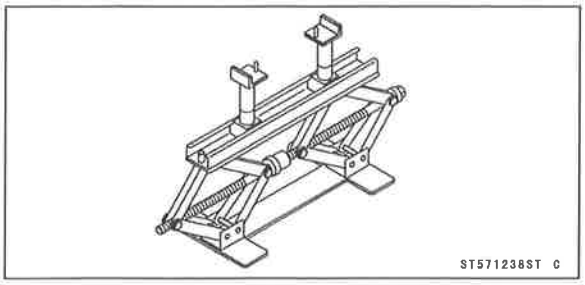
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Inner Cover Bolts	0.50	0.05	4.4 in·lb	
2	Intake Air Duct Fairing Mounting Screws (L = 16 mm)	3.0	0.31	27 in·lb	
3	Headlight Mounting Screws	3.0	0.31	27 in·lb	
4	Intake Air Duct Fairing Mounting Screws (L = 14 mm)	3.0	0.31	27 in·lb	
5	Electric Windshield Actuator Cover Bolts	3.0	0.31	27 in·lb	
6	Windshield Cover Bolts (L = 12 mm)	3.0	0.31	27 in·lb	
7	Windshield Cover Bolts (L = 16 mm)	5.5	0.56	49 in·lb	
8	Intake Windshield Assembly Bolts (M5)	5.5	0.56	49 in·lb	
9	Intake Windshield Assembly Bolts (M6)	9.0	0.92	80 in·lb	
10	Meter Bracket Mounting Bolt	7.0	0.71	62 in·lb	
11	Rear View Mirror Nuts	8.0	0.82	71 in·lb	

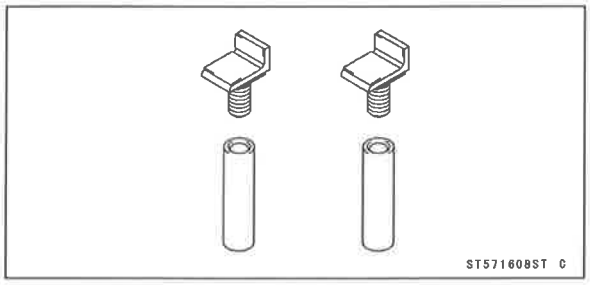
12. Frame No. JKBZGT40EEA004495 ~
G: Apply grease. (Apply grease to the ball contacted surface, and wipe the grease of extended off.)

Special Tools

Jack:
57001-1238



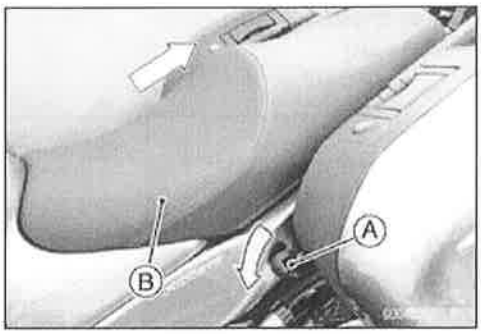
Jack Attachment:
57001-1608



Seat

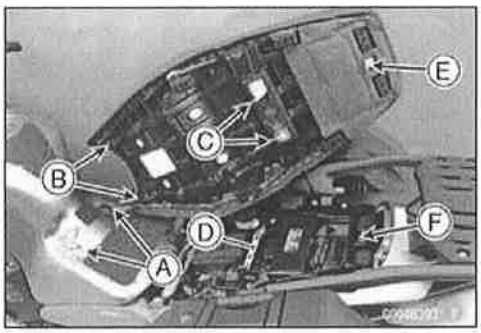
Seat Removal

- Insert the key knob [A] into the seat lock and, turning the key counterclockwise, pulling up on the rear of the seat [B], and pulling the seat backward.



Seat Installation

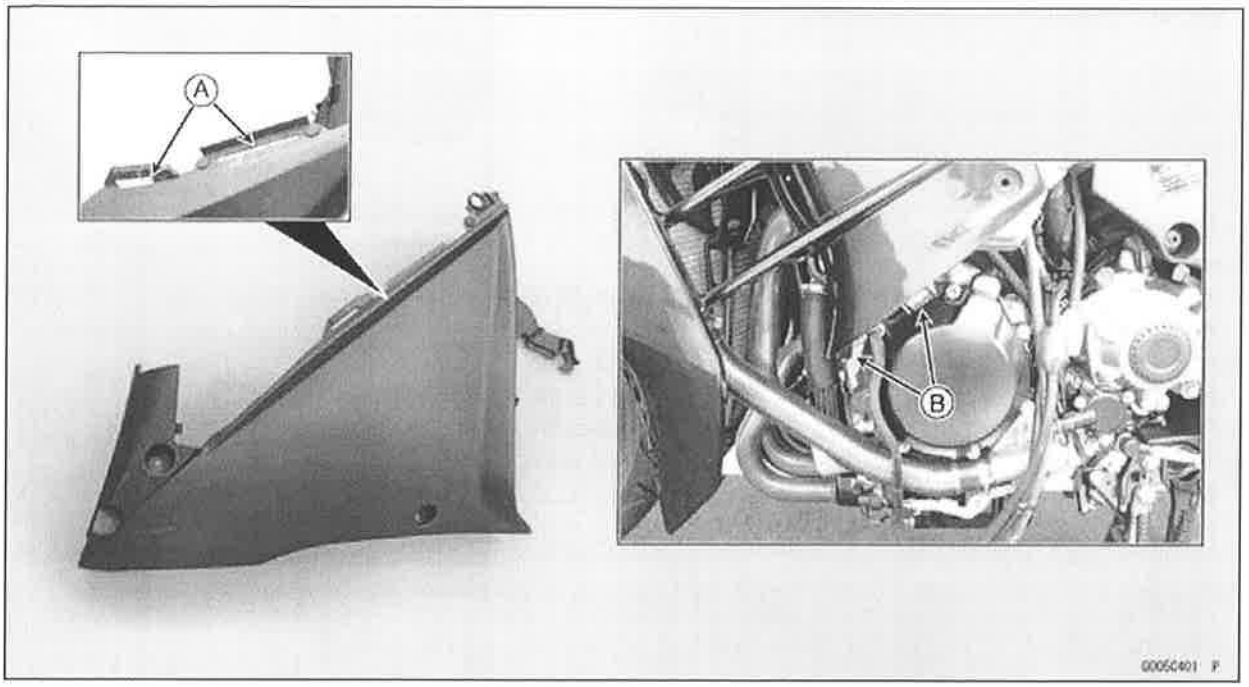
- Insert the brackets [A] of the fuel tank into the slots [B] of the seat.
- Insert the hooks [C] of the seat under the frame [D], and insert the seat projection [E] into the slot [F] of the frame.
- Push down the rear part of the seat until the lock clicks.
- Pull up the front and rear end of the seat to make sure they are securely locked.



Fairings

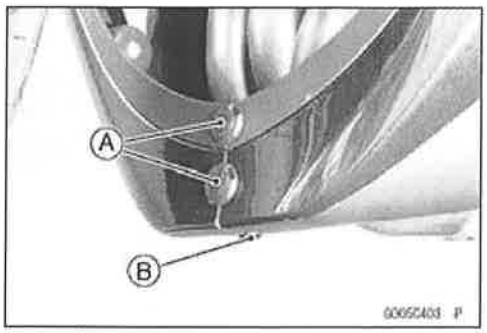
Lower Fairing Removal

Slots [A]
Tabs [B]



- Remove the quick rivets.

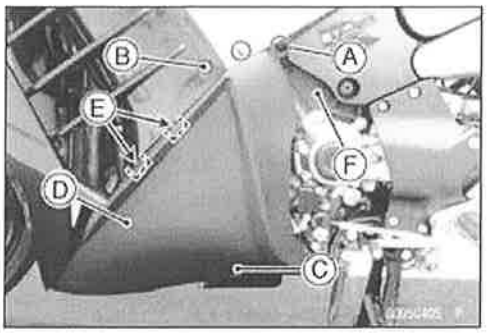
○Pull up the core of the quick rivets [A] with the flat tip screwdriver.
○Push the central pin of the quick rivet [B].



- Remove the lower fairing screws [A].

Fairings

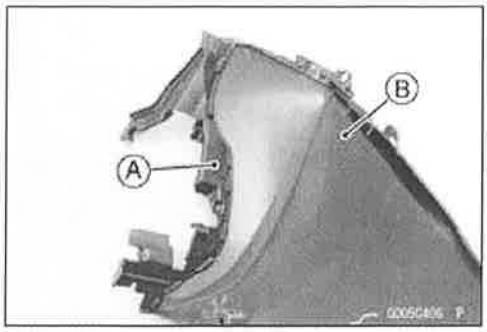
- Remove:
  Quick Rivets [A]
  Rear Middle Fairing Bolt (M6, L = 14 mm) [B]
  Lower Fairing Bolt [C]
- Pull down the lower fairing [D] to clear the slots of the lower fairing from the tabs [E] of the rear middle fairing.
- Remove the lower fairing together with the rubber cover [F].

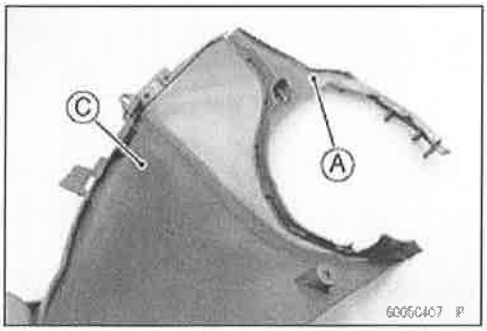


Lower Fairing Installation

- Be sure to install the rubber cover [A] on the lower fairing.

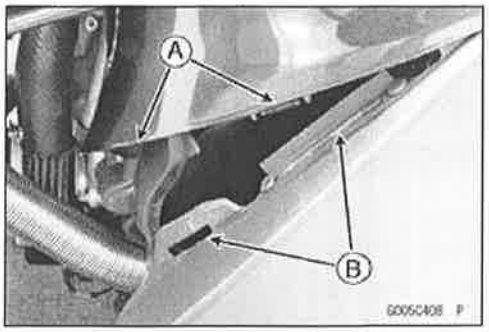
○Insert the tabs of the lower fairing into the slots of the rubber cover.
  Left Lower Fairing [B]
  Right Lower Fairing [C]



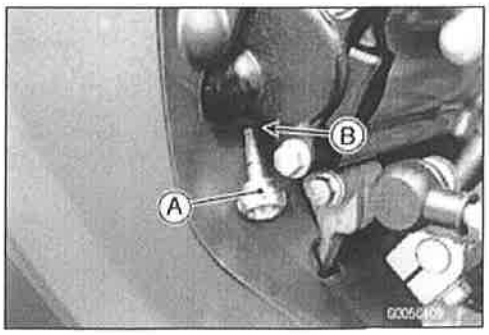


- Insert the tabs [A] into the slots [B].
- Install the quick rivets and push the core of them.
- Tighten:

Torque - Lower Fairing Bolt: 4.0 N·m (0.41 kgf·m, 35 in·lb)
Rear Middle Fairing Bolt (M6, L = 14 mm): 4.0 N·m (0.41 kgf·m, 35 in·lb)
Lower Fairing Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)



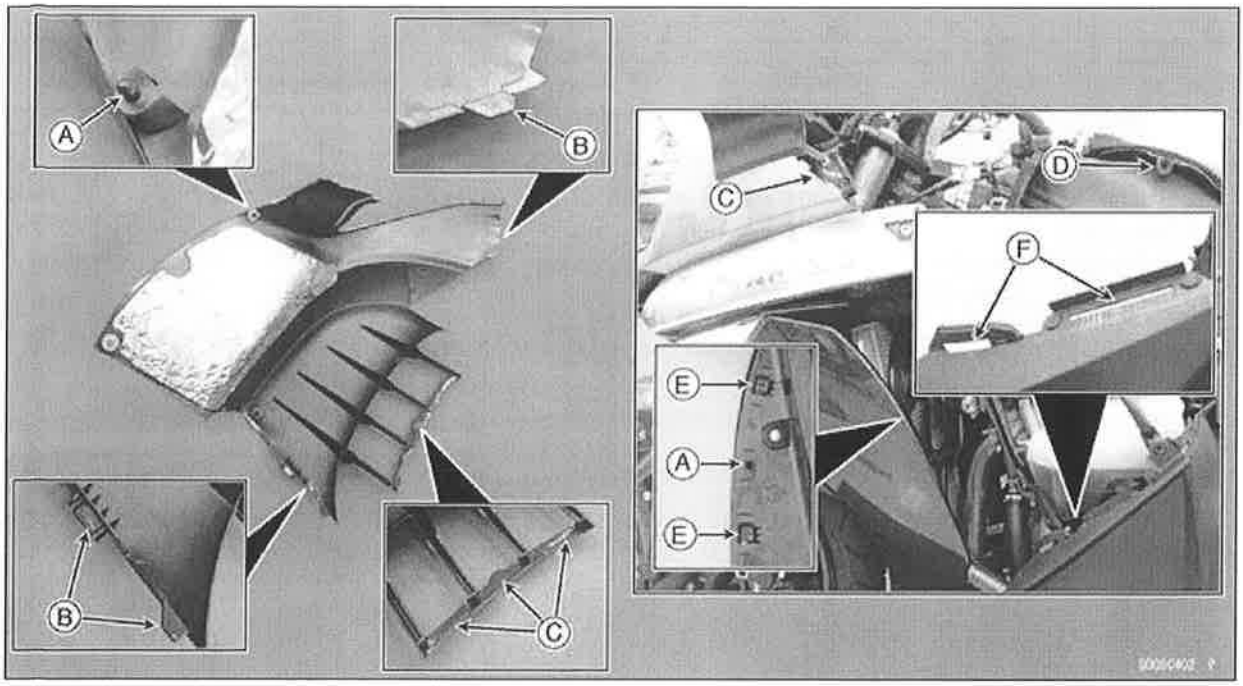
- Fit the rubber cover to the original position.
- For the left lower fairing, insert the idle adjusting screw [A] into the hole [B] of the rubber cover.



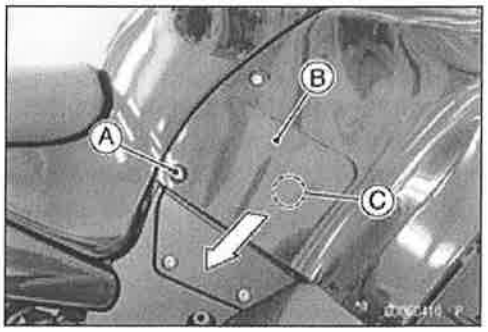
Fairings

Rear Middle Fairing Removal

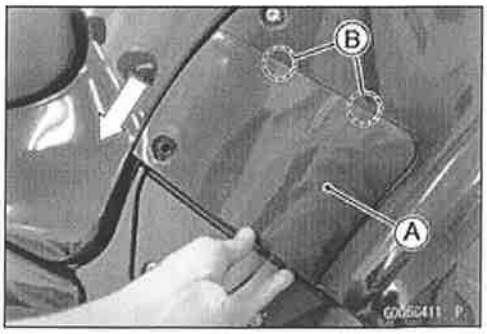
Projections [A]
Tabs [B]
Grooves [C]
Grommet [D]
Hooks [E]
Slots [F]



- Remove:
  Inner Cover (see Inner Cover Removal)
- For the right side, remove the right cover bolt [A] and washer.
- For the right side, pull the right cover [B] outward to clear the projection [C] of the right cover.

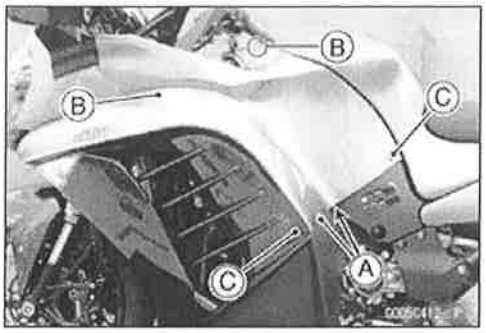


- For the right side, pull the right cover [A] downward to clear the tabs [B] of the right cover.

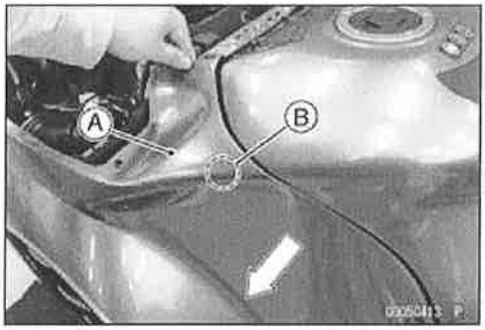


Fairings

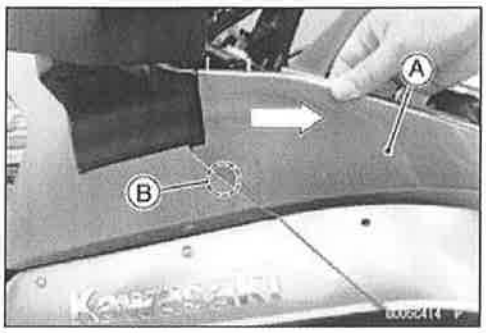
- Remove:
  Quick Rivets [A]
  Rear Middle Fairing Bolts (M5) [B] and Washers
  Rear Middle Fairing Bolts (M6) [C] and Washers



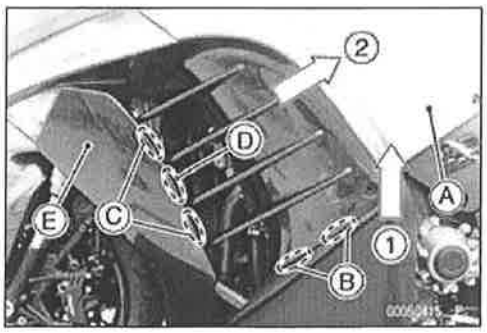
- Pull the rear middle fairing [A] outward to clear the projection [B] of the rear middle fairing.



- Pull the rear middle fairing [A] backward to clear the tab [B] of the rear middle fairing.

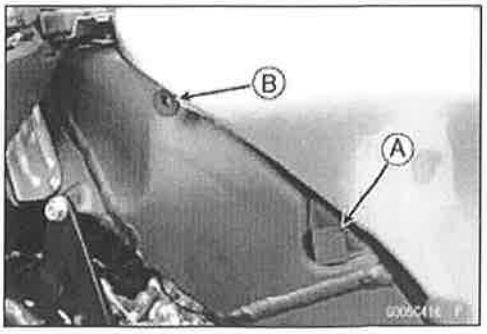


- Pull the rear middle fairing [A] upward to clear the tabs [B] of the rear middle fairing.
- Pull the rear middle fairing backward to clear the hooks [C] and projection [D] of the front middle fairing [E].



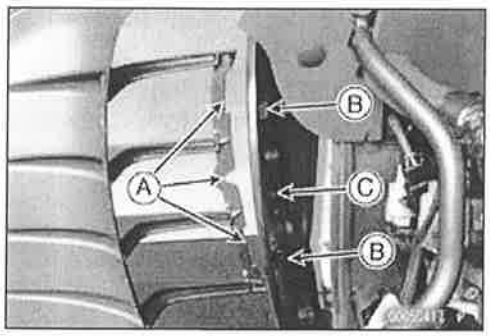
Rear Middle Fairing Installation

- Check that the pad [A] is in place on the frame.
- When installing the grommet [B], face the large diameter side outward.

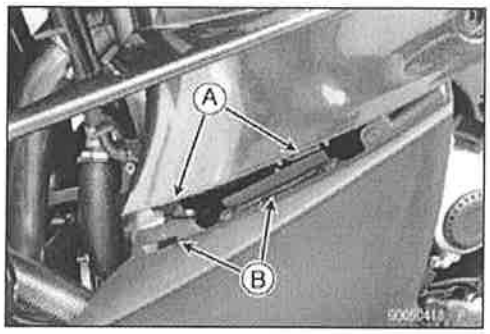


Fairings

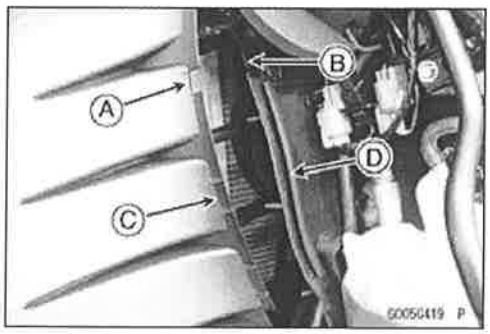
- Fit the grooves [A] of the rear middle fairing to the hooks [B] and projection [C] of the front middle fairing.



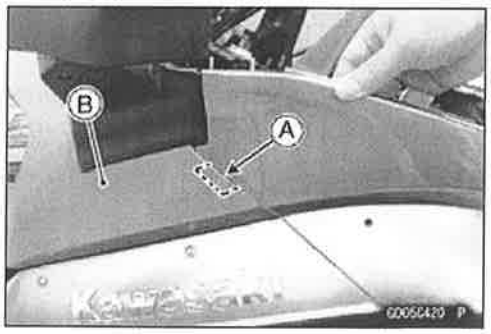
- Insert the tabs [A] of the rear middle fairing into the slots [B] of the lower fairing.



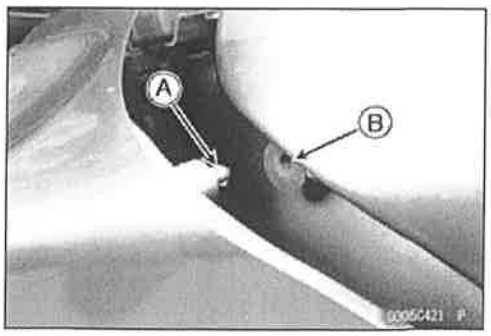
- Fit the groove [A] of the rear middle fairing to the hook [B] of the radiator cover.
- Insert the edge [C] of rear middle fairing into the groove [D] of the left inner rubber cover.



- Insert the tab [A] of the rear middle fairing into the inside of the upper fairing [B].

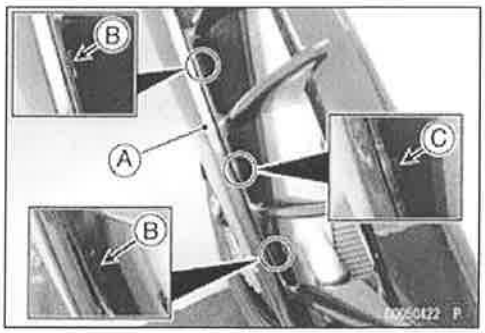


- Insert the projection [A] of the rear middle fairing into the grommet [B] on the fuel tank.



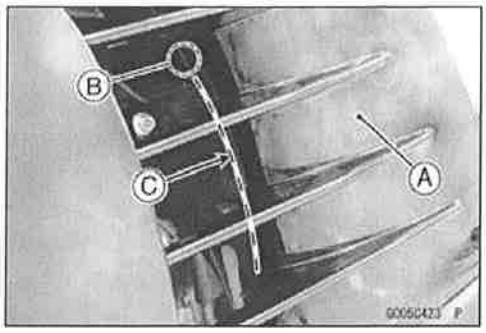
Fairings

- Check that the grooves of the rear middle fairing [A] are in place into the hooks [B] and projection [C] of the front middle fairing.



- Check that the groove of the rear middle fairing [A] is in place to the hook [B] of the radiator cover.
- Check that the edge rear middle fairing is in place into the groove [C] of the left inner rubber cover.
- Tighten:

Torque - Rear Middle Fairing Bolt (M6, L = 30 mm): 1.0 N·m (0.10 kgf·m, 8.9 in·lb)
Rear Middle Fairing Bolts (M6, L = 14 mm): 4.0 N·m (0.41 kgf·m, 35 in·lb)
Rear Middle Fairing Bolts (M5): 0.50 N·m (0.05 kgf·m, 4.4 in·lb)

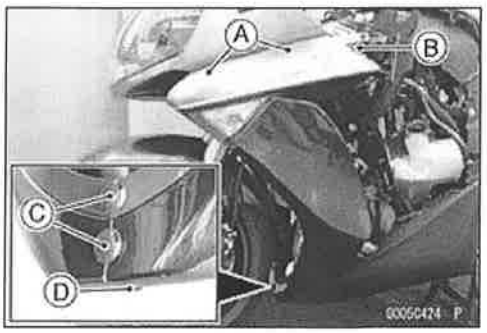


- Install the quick rivet.
- Install the inner cover (see Inner Cover Installation).

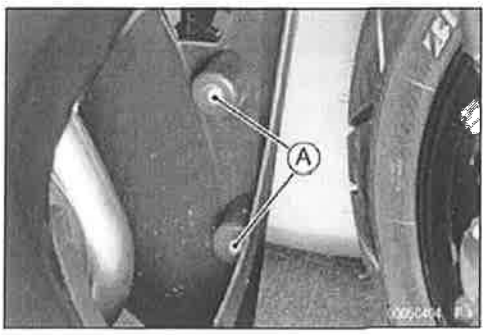
Front Middle Fairing Removal

- Remove:
  Rear Middle Fairing (see Rear Middle Fairing Removal)
  Upper Inner Fairing (see Upper Inner Fairing removal)
  Front Middle Fairing Bolts (M5) [A] and Washers
  Front Middle Fairing Bolt (M6) [B] and Washer
  Quick Rivets

○Pull up the core of the quick rivets [C] with the flat tip screwdriver.
○Push the central pin of the quick rivet [D].



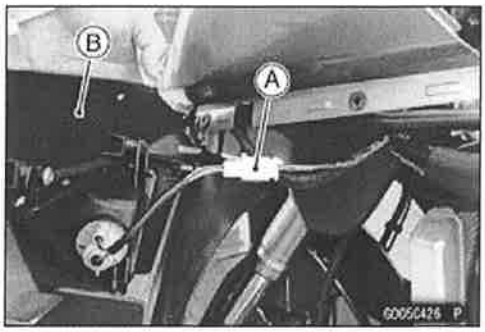
- Remove the lower fairing screws [A].



Fairings

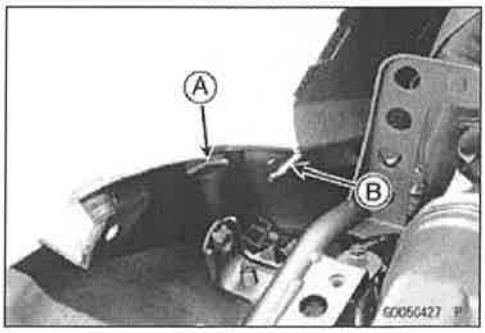
- Pull the front middle fairing backward to clear the hooks [A] of the front middle fairing.

- Disconnect the both front turn signal light lead connectors [A].
- Remove the front middle fairing [B].



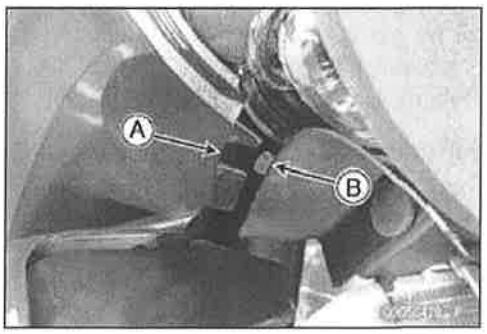
Front Middle Fairing Installation

- Connect the both turn signal lead connectors.
- Insert the hook [A] of the front middle fairing into the groove [B] of the upper fairing.



- Fit the groove [A] of the front middle fairing to the hook [B] of the radiator cover.
- Install the quick rivet.
- Tighten:

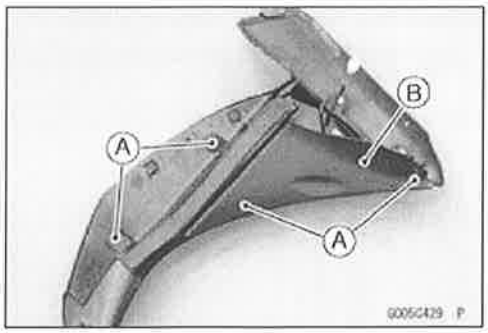
Torque - Lower Fairing Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)
Front Middle Fairing Bolt (M6): 4.0 N·m (0.41 kgf·m, 35 in·lb)
Front Middle Fairing Bolts (M5): 0.50 N·m (0.05 kgf·m, 4.4 in·lb)



- Install the removed parts (see appropriate chapters).

Fairings

Front Middle Fairing Disassembly



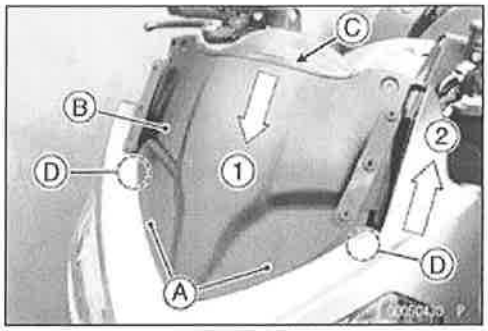
- Remove:
  Front Middle Fairing (see Front Middle Fairing Removal)
  Screws [A]
  Front Middle Fairing Inner Cover [B]

Front Middle Fairing Assembly

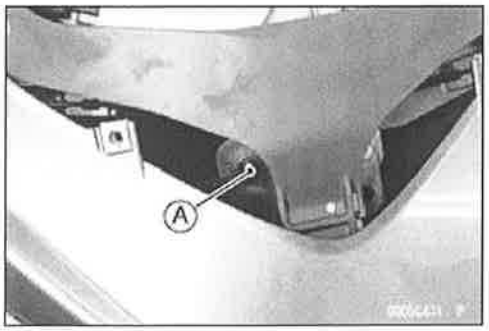
- Assembly is the reverse of disassembly.
- Tighten:

Torque - Front Middle Fairing Inner Cover Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

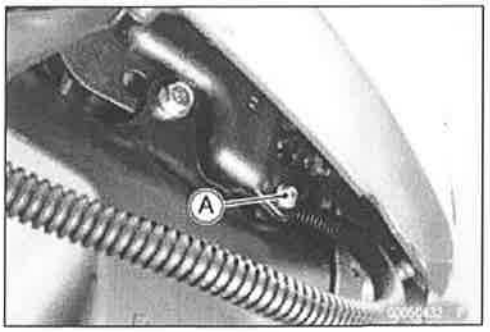
Upper Fairing Removal



- Remove:
  Front Middle Fairing (see Front Middle Fairing Removal)
  Windshield (see Windshield Removal)
  Rear View Mirrors (see Rear View Mirror Removal)
  Electric Windshield Actuator Cover Bolts [A]
- Pull down the electric windshield actuator cover [B] to clear the hook [C] of the meter cover.
- Pull up the electric windshield actuator cover to clear the hooks [D] of the electric windshield actuator cover.



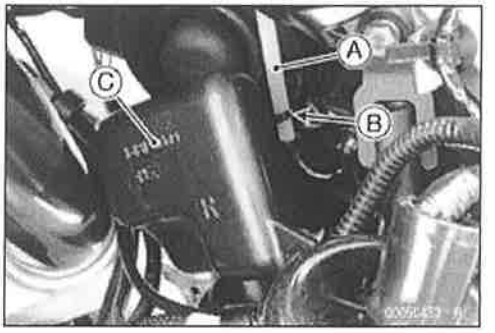
- Remove the upper fairing bolt [A].



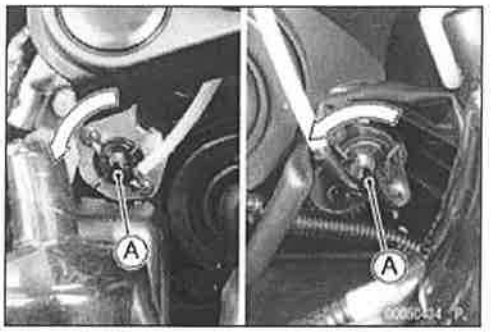
- Remove:
  Resonator Mounting Bolt [A] (Right Side only)

Fairings

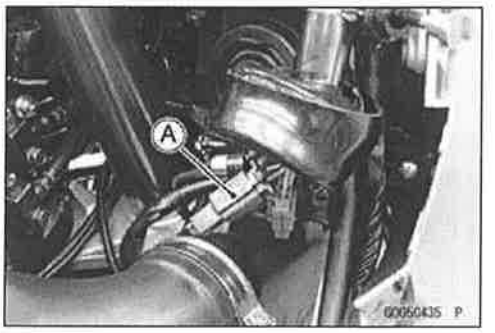
- Free the headlight aiming cable [A] from the clamp [B], and remove the right resonator [C].



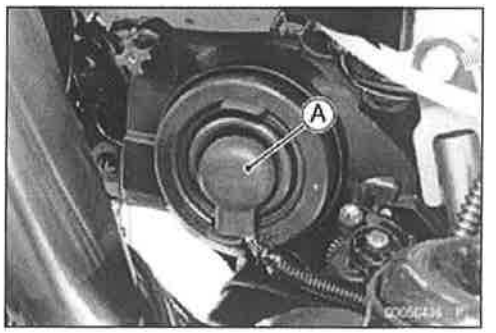
- Turn the fittings [A] of the headlight aiming cable counter-clockwise and remove them.



- Disconnect the city light lead connector [A].

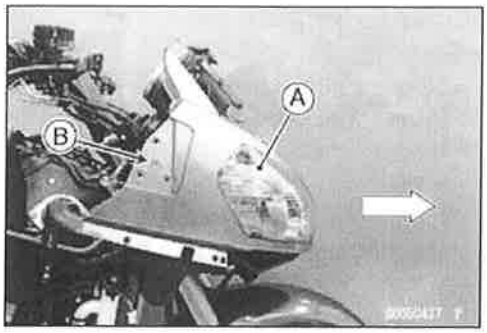


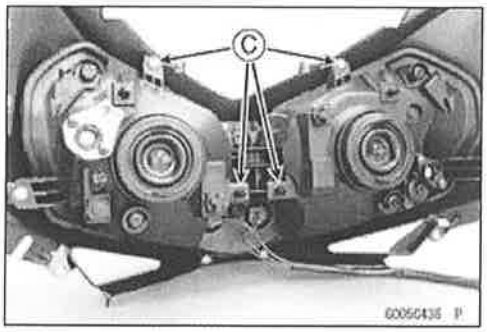
- Disconnect the headlight connector [A] (both sides).

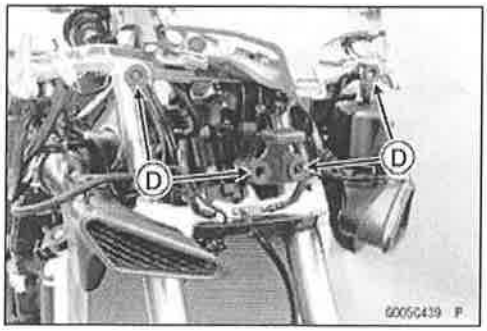


Fairings

- Pull the upper fairing [A] outward to clear the projection [B] of the rear view mirror bracket.
- Pull the upper fairing forward to clear the projections [C] of the upper fairings from the grommets [D] of the brackets.

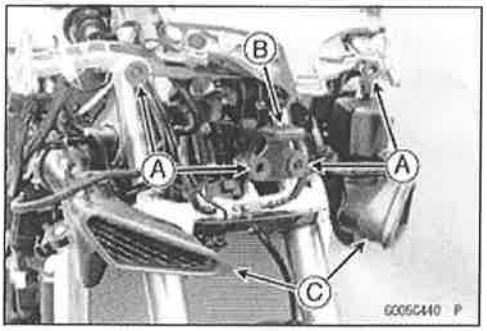


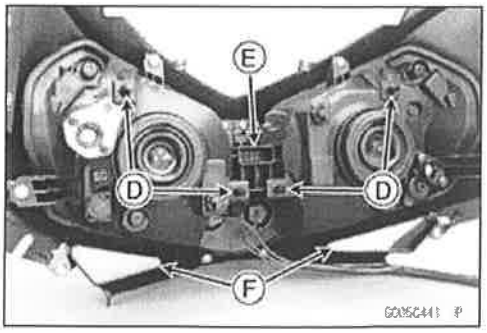




Upper Fairing Installation

- Installation is the reverse of removal.
- Check that the following parts are in place.
  Grommets [A]
  Damper [B]
  Rubber Seals [C]
- Insert the projections [D] of the upper fairing into the grommets [A] of the bracket.
- Insert the damper [B] into the hole [E] of the upper fairing.
- Fit the rubber seals [C] onto the intake air duct fairing [F].
- Run the leads and cables correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

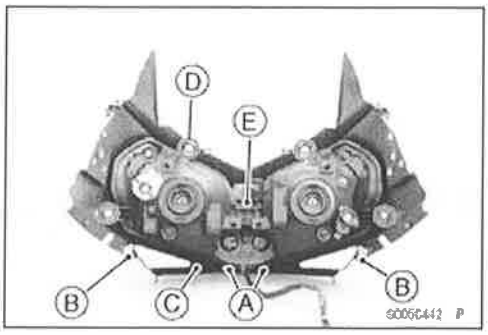




Fairings

Upper Fairing Disassembly

- Remove:
  Upper Fairing (see Upper Fairing Removal)
  Intake Air Duct Fairing Mounting Screws (L = 14 mm) [A]
  Intake Air Duct Fairing Mounting Screws (L = 16 mm) [B]
  Intake Air Duct Fairing [C]
  Headlight Mounting Screws [D]
  Headlight [E]

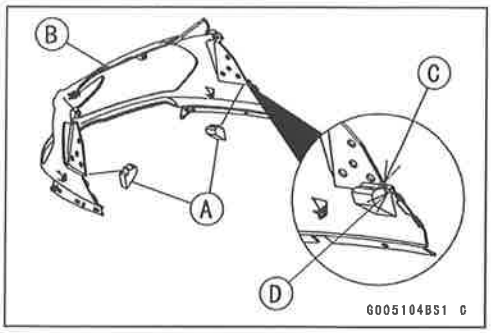


Upper Fairing Assembly

(Frame No. JKBZGT40EEA004495 ~)

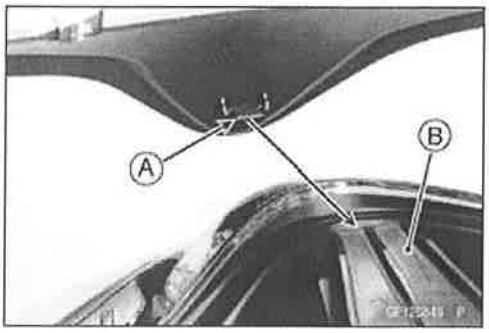
- Check that the pads [A] are in place on Upper Fairing [B].

○Align [C] the edge of pad with the end of the upper fairing.
○Fit the pad so that is covered with upper fairing [D].



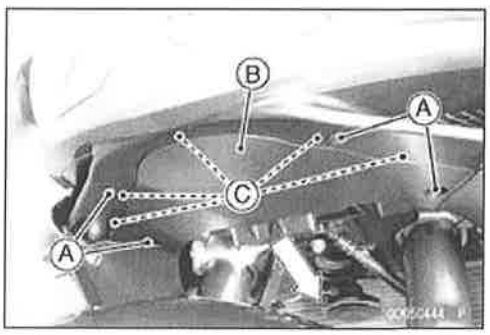
- Assembly is the reverse of disassembly.
- Fit the tab [A] of the upper fairing into the slot of the headlight bracket [B].
- Tighten:

Torque - Headlight Mounting Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)
Intake Air Duct Fairing Mounting Screws (L = 16 mm): 3.0 N·m (0.31 kgf·m, 27 in·lb)
Intake Air Duct Fairing Mounting Screws (L = 14 mm): 3.0 N·m (0.31 kgf·m, 27 in·lb)



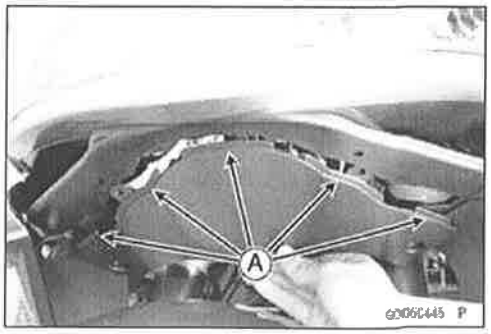
Upper Inner Fairing Removal

- Remove the quick rivets [A].
- Pull the upper inner fairing [B] backward to clear the tabs [C] of the upper inner fairing.



Upper Inner Fairing Installation

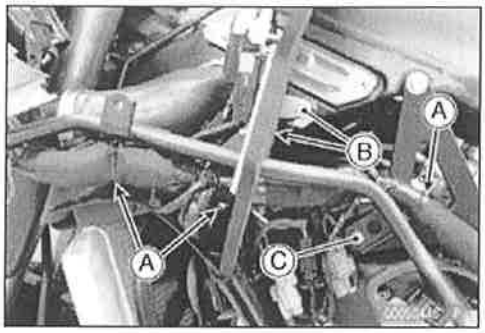
- Insert the tabs [A] of the upper inner fairing into the inside of the upper fairing.
- Install the quick rivets.



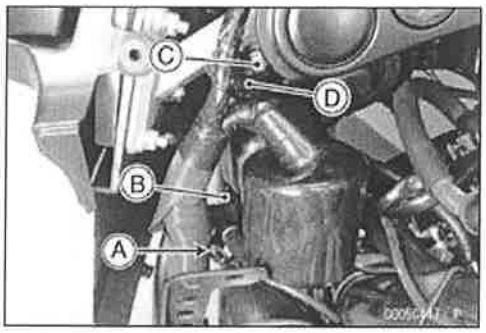
Fairings

Left Fairing Stay Removal

- Remove:
  Left Front Middle Fairing (see Front Middle Fairing Removal)
- Open the clamps [A].
- Remove:
  Pad Bracket Bolts [B]
  Fairing Stay Bolts [C]

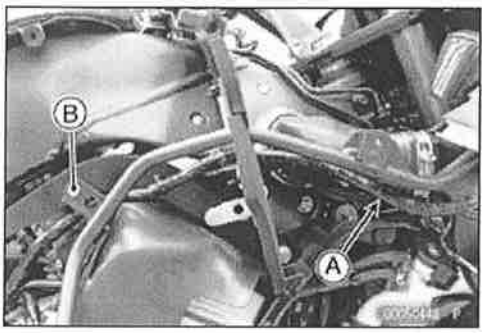


- Open the clamp [A].
- Remove:
  Air Cleaner Element Cover Bolt [B]
  Fairing Stay Bolt [C]
  Left Fairing Stay [D]

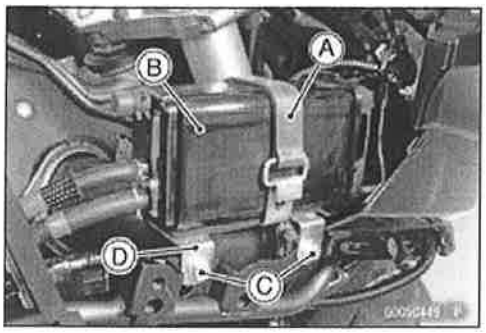


Right Fairing Stay Removal

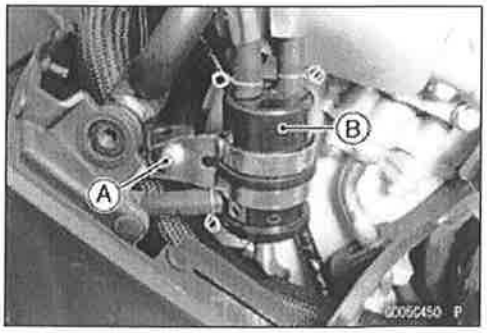
- Remove:
  Right Front Middle Fairing (see Front Middle Fairing Removal)
- Open the clamp [A].
- Remove the fairing stay bolt [B].



- Remove (CAL, CN, SEA-B1 and TH Models):
  Band [A]
  Canister [B]
  Bolts [C]
  Bracket [D]

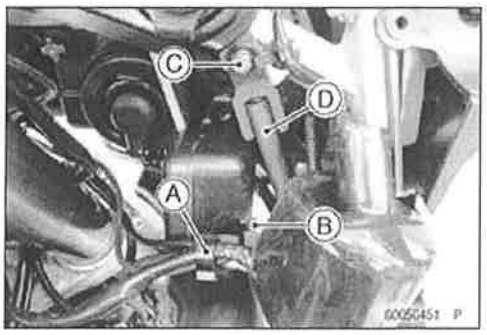


- Remove (CAL, CN, SEA-B1 and TH Models):
  Bolt [A]
  Separater [B]



Fairings

- Open the clamp [A].
- Remove:
  Air Cleaner Element Cover Bolt [B]
  Fairing Stay Bolt [C]
  Right Fairing Stay [D]



Fairing Stay Installation

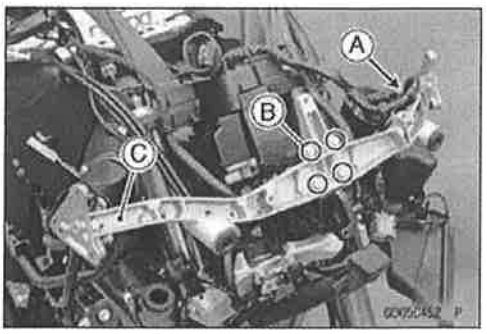
- Installation is the reverse of removal.
- Run the leads and cables correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Torque - Air Cleaner Element Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Fairing Stay Bolts: 7.0 N·m (0.71 kgf·m, 62 in·lb)
Pad Bracket Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)

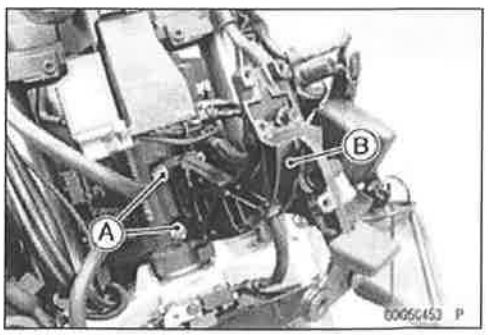
Upper Fairing Bracket Removal

- Remove:
  Upper Fairing (see Upper Fairing Removal)
  Meter Cover (see Meter Cover Removal)
  Electric Windshield Assembly (see Electric Windshield Assembly Removal in the Electrical System chapter)

- Open the clamp [A].
- Remove:
  Rear View Mirror Bracket Bolts [B]
  Rear View Mirror Bracket [C]



- Remove:
  Upper Fairing Bracket Nuts [A] and Bolts
  Upper Fairing Bracket [B]



Upper Fairing Bracket Installation

- Replace the upper fairing bracket nuts with new ones.
- Installation is reverse of removal.
- Tighten:

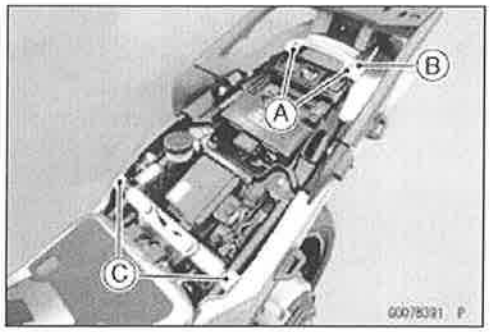
Torque - Upper Fairing Bracket Nuts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Run the leads and cables correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

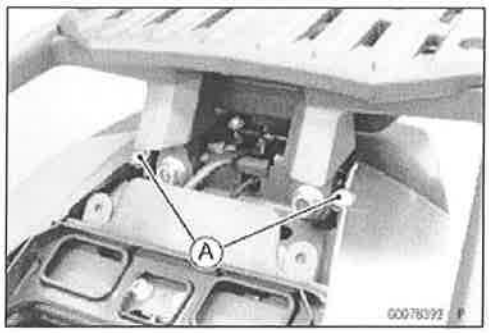
Seat Cover

Seat Cover Removal

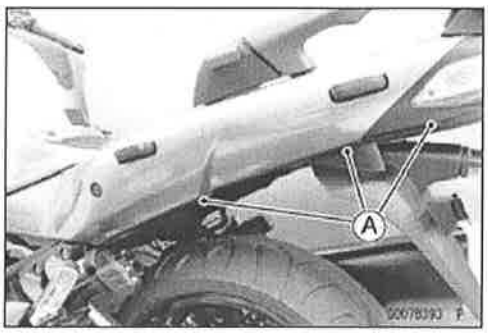
- Remove:
  Saddlebags (see Saddlebag Removal)
  Seat (see Seat Removal)
  Center Seat Cover Bolts [A] and Washers
  Center Seat Cover [B]
  Seat Cover Bolts [C] and Washer



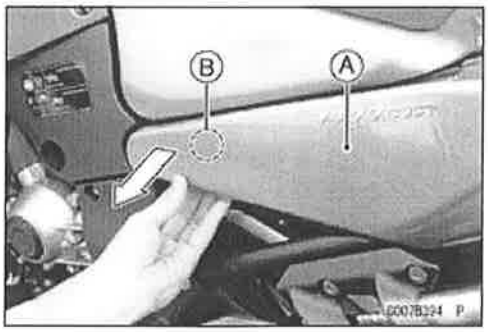
- Remove:
  Seat Cover Bolts [A] and Washers



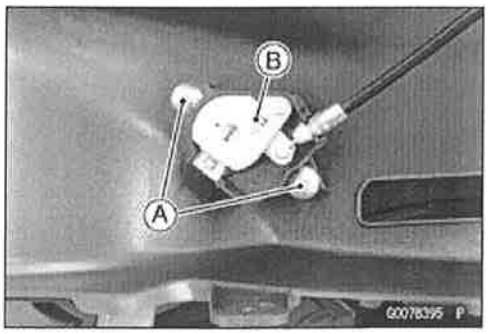
- Remove the quick rivets [A].



- Pull the seat cover [A] outward to clear the projection [B] of the seat cover.



- For the left side seat cover, remove the seat lock screws [A] and seat lock assy with cable [B].



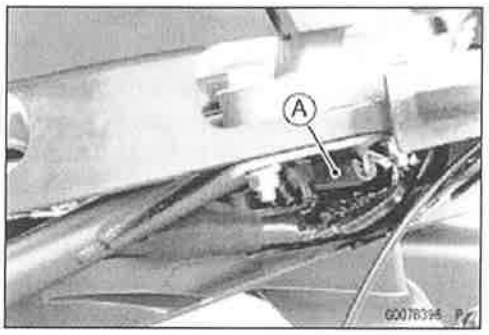
Seat Cover Installation

- For the left side seat cover, install the seat lock assy.
- Tighten:

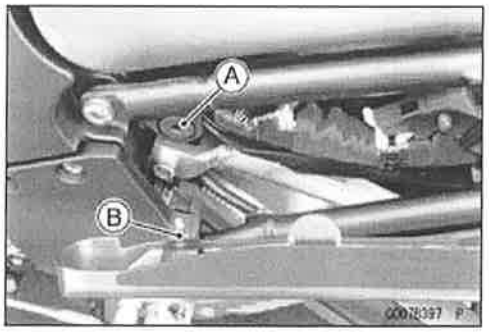
Torque - Seat Lock Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)

Seat Cover

- Check that the trim [A] is in place.



- When installing the grommet [A], face the tapered side inward.
- Insert the projection [B] of the seat cover into the grommet of the frame.



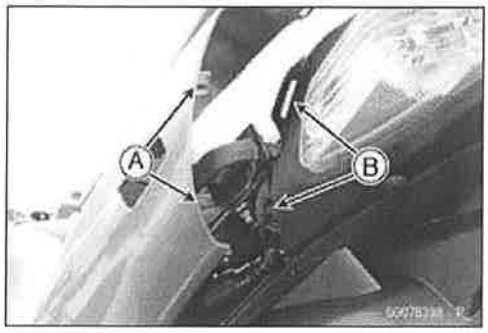
- Insert the tabs [A] of the seat cover into the slots [B] of the tail cover.
- Tighten:

Torque - Seat Cover Bolts: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the center seat cover.
- Tighten:

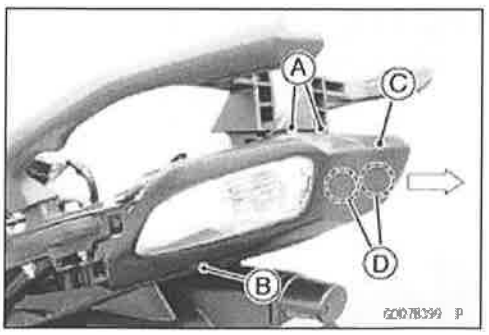
Torque - Center Seat Cover Bolts: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the removed parts (see appropriate chapters).

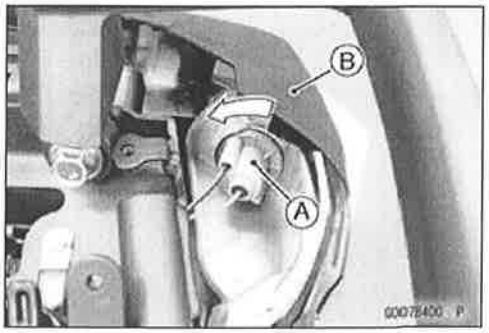


Tail Cover Removal

- Remove:
  Seat Covers (see Seat Cover Removal)
  Tail/Brake Light (LED) (see Tail/Brake Light (LED) Removal in the Electrical System chapter)
  Tail Cover Bolts [A] and Washers
  Quick Rivet [B] (Both Sides)
- Pull out the tail cover [C] backward to clear the projection [D] of the tail cover.



- Turn the socket [A] counterclockwise on both sides.
- Remove the tail cover [B].

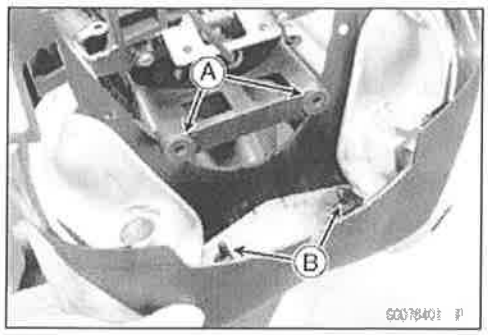


Seat Cover

Tail Cover Installation

- Installation is the reverse of removal.
- When installing the grommets [A], face the large diameter side outward.
- Insert the projections [B] of the tail cover into the grommet of the frame.
- Tighten:

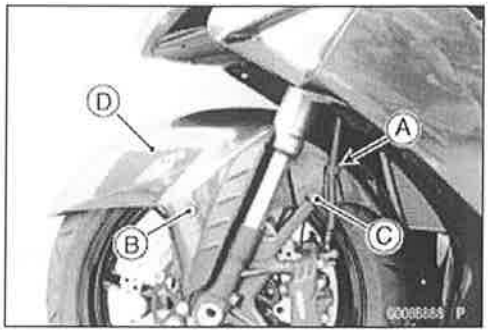
Torque - Tail Cover Bolts: 3.0 N·m (0.31 kgf·m, 27 in·lb)



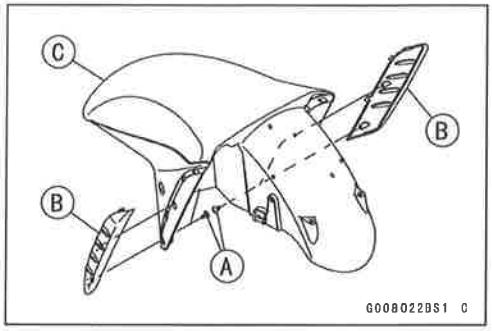
Fenders

Front Fender Removal

- Open the clamp [A] on both sides.
- Remove:
  Front Fender Mounting Bolt (L = 14 mm) [B] and Washer (Both Sides)
  Front Fender Mounting Bolt (L = 30 mm) [C] (Both Sides)
  Front Fender Assy [D]



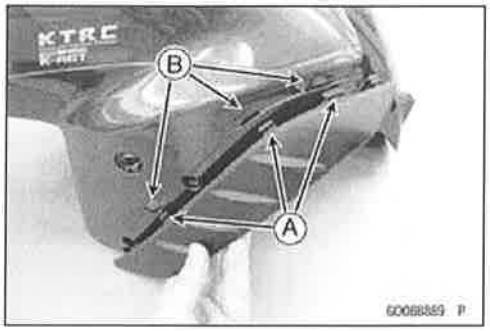
- Remove the screws [A].
- Separate the front fender covers [B] and front fender [C].



Front Fender Installation

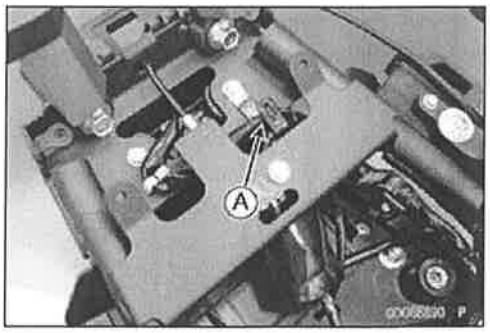
- Installation is the reverse of removal.
- Insert the hooks [A] of the front fender cover into the slots [B] of the front fender on both sides.
- Tighten:

Torque - Front Fender Cover Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)

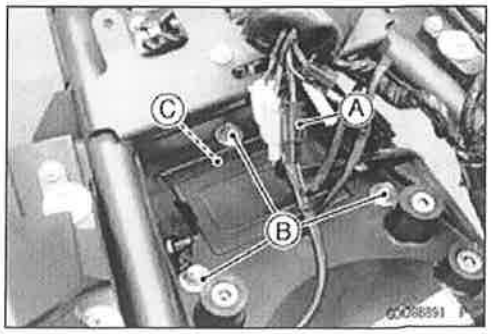


Flap and Rear Fender Removal

- Remove:
  Saddlebags (see Saddlebag Removal)
  Seat (see Seat Removal)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Tail Cover (see Tail Cover Removal)
- Open the clamp [A].

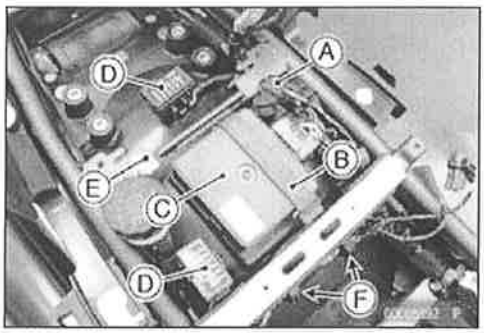


- Slide the dust cover and disconnect the license plate light lead connector [A].
- Remove:
  Flap Mounting Nuts [B] and Washers
  Bolt [C]
  Flap

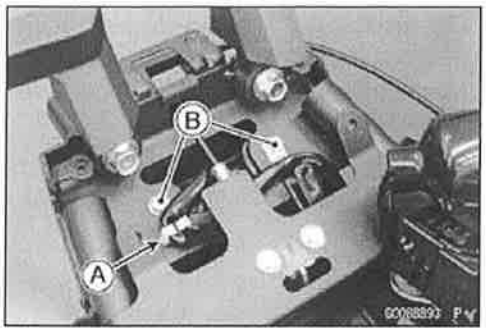


Fenders

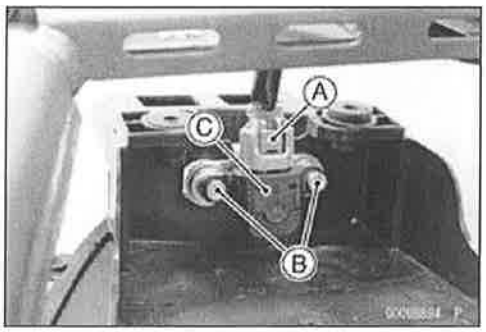
- Remove:
  Atmospheric Pressure Sensor [A] (Atmospheric Pressure Sensor Removal in the Self-Diagnosis System chapter)
  Band [B]
  KIPASS ECU [C]
  Fuse Boxes [D]
  Rear Brake Reservoir Bracket Bolt [E]
- Open the clamps [F].



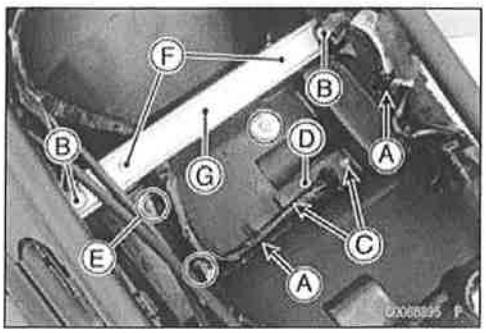
- Free the lead from the clamp [A].
- Remove:
  Rear Fender Mounting Bolts [B]



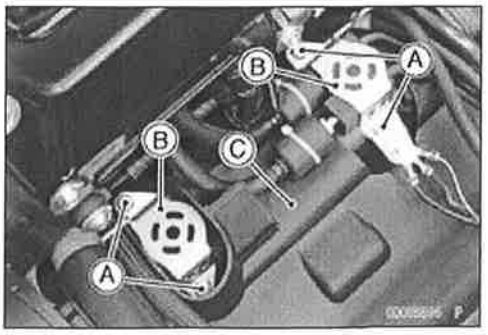
- Disconnect:
  Vehicle-down Sensor Lead Connector [A]
- Remove:
  Vehicle-down Sensor Bolts [B]
  Vehicle-down Sensor [C]



- Open the clamps [A].
- Remove:
  Rear Fender Mounting Bolts [B]
  Lead Cover Bolts [C]
  Lead Cover [D]
  Regulator/Rectifier Mounting Nuts [E]
- Disconnect the regulator/rectifier connector and remove the regulator/rectifier.
- Remove:
  Cross Bar Bolts [F]
  Cross Bar [G]

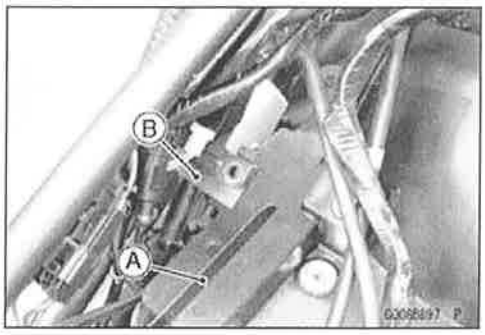


- Remove:
  Bracket Bolts [A]
  Brackets [B]
- Pull out the rear fender [C] backward.



Fenders

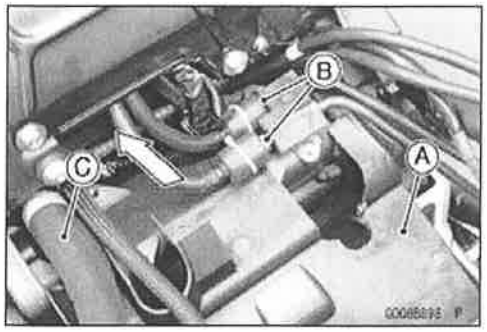
- Clear the rear fender [A] from the frame bracket [B].
- Remove the rear fender.



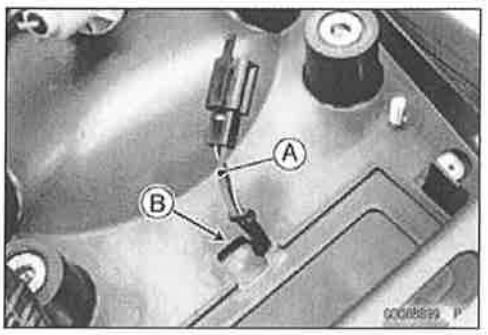
Flap and Rear Fender Installation

- Installation is the reverse of removal.
- Insert the rear fender [A] under the pipes [B] and main harness [C].
- Tighten:

Torque - Bracket Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)



- Before installing the flap, run the license plate light lead [A] to the holes [B] of the rear fender and flap.

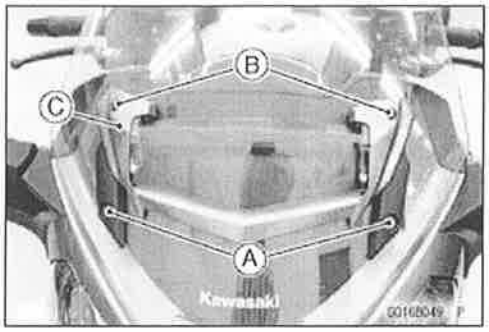


- Replace the flap mounting nuts and regulator/rectifier mounting nuts with new ones.
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

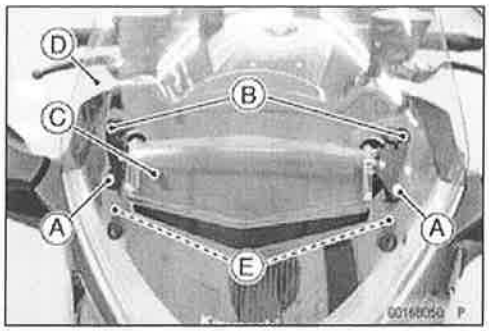
Windshield

Windshield Removal

- Remove:
  Windshield Cover Bolts (L = 16 mm) [A] and Washers
  Windshield Cover Bolts (L = 12 mm) [B] and Washers
  Windshield Cover [C]



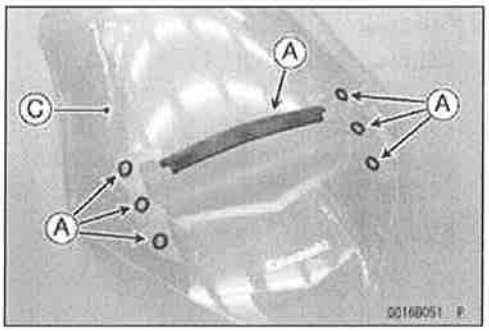
- Remove:
  Intake Windshield Assembly Bolts (M6) [A]
  Intake Windshield Assembly Bolts (M5) [B] and Washers
  Intake Windshield Assembly [C]
  Windshield [D]
  Rubber Damper [E]

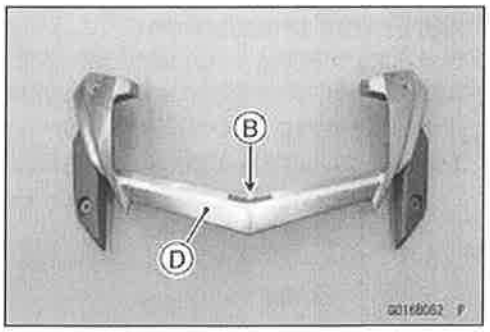


Windshield Installation

- Installation is the reverse of removal.
- Check that the dampers [A] and pad [B] are in place on the windshield [C] and windshield cover [D].
- Tighten:

Torque - Intake Windshield Assembly Bolts (M5): 5.5 N·m (0.56 kgf·m, 49 in·lb)
Intake Windshield Assembly Bolts (M6): 9.0 N·m (0.92 kgf·m, 80 in·lb)
Windshield Cover Bolts (L = 16 mm): 5.5 N·m (0.56 kgf·m, 49 in·lb)
Windshield Cover Bolts (L = 12 mm): 3.0 N·m (0.31 kgf·m, 27 in·lb)

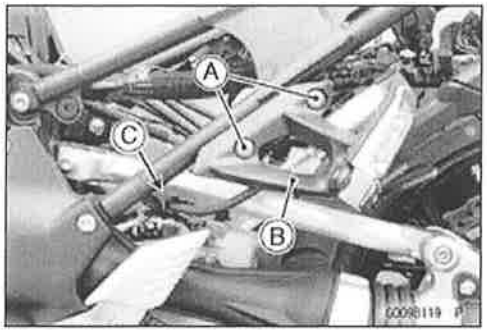




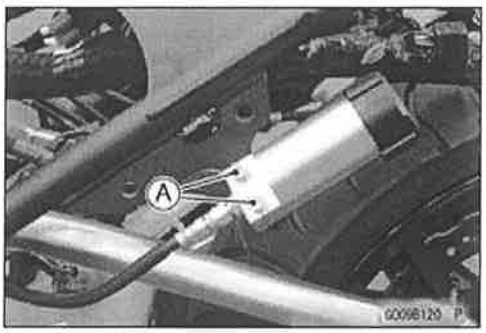
Frame

Rear Frame Removal

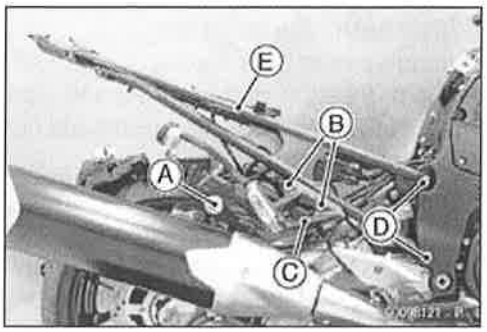
- Remove:
  Rear Fender (see Rear Fender Removal)
  Carrier Bracket (see Carrier Removal)
  Left Rear Footpeg Bracket Bolts [A]
  Left Rear Footpeg Bracket [B]
- Open the clamp [C].



- Remove:
  Spring Preload Adjuster Bolts [A]



- Remove:
  Muffler Body Bolt [A] and Nut
  Right Rear Footpeg Bracket Bolts [B]
  Right Rear Footpeg Bracket [C]
  Rear Frame Bolts [D] (Both Sides)
  Rear Frame [E]



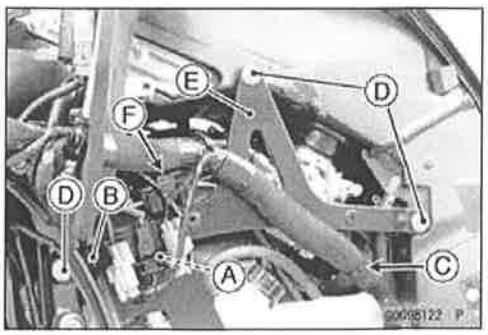
Rear Frame Installation

- Installation is the reverse of removal.
- Apply a non-permanent locking agent to the thread of the rear frame bolt, and tighten them.

Torque - Rear Frame Bolts: 45 N·m (4.6 kgf·m, 33 ft·lb)
Spring Preload Adjuster Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)
Rear Footpeg Bracket Bolts: 35 N·m (3.6 kgf·m, 26 ft·lb)

Left Subframe Removal

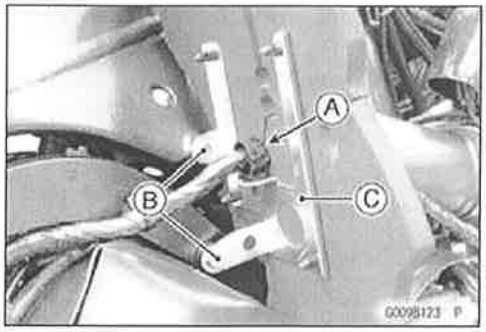
- Remove:
  Left Fairing Stay (Left Fairing Stay Removal)
  Connector Bracket Bolt [A]
  Quick Rivet [B]
- Open the clamp [C].
- Remove the subframe bolts [D].
- Pull out the subframe [E] from the damper [F], using a rubber lubricant.



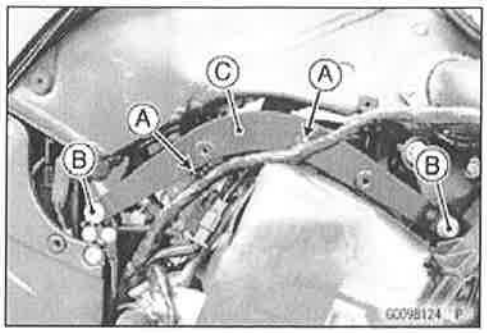
Frame

Right Subframe Removal

- Remove the right fairing stay (see Right Fairing Stay Removal).
- Open the clamp [A].
- Remove:
  Pad Bracket Bolts [B]
  Pad Bracket [C]



- Open the clamps [A].
- Remove:
  Subframe Bolts [B]
  Right Subframe [C]



Subframe Installation

- Installation is the reverse of removal.
- Replace the subframe bolts with new ones.

Torque - Subframe Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)

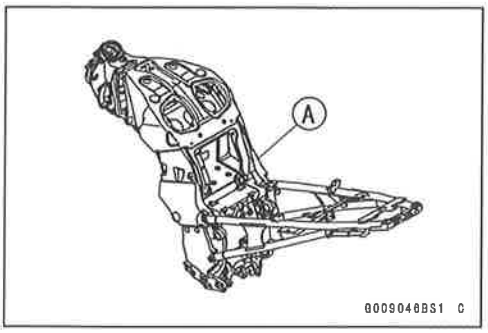
Frame Inspection

- Visually inspect the frame [A] for cracks, dents, bending, or warp.

★If there is any damage to the frame, replace it.

⚠ WARNING

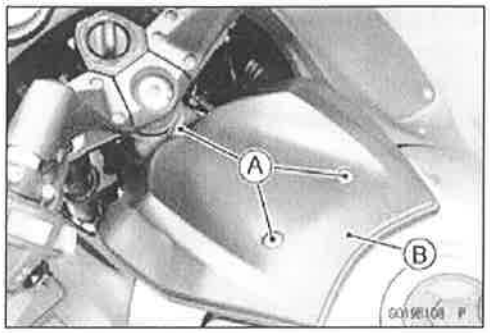
A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.



Cover

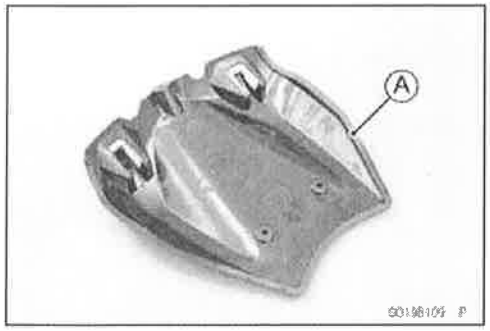
Front Fuel Tank Cover Removal

- Remove:
  Bolts [A] and Washers
  Front Fuel Tank Cover [B]



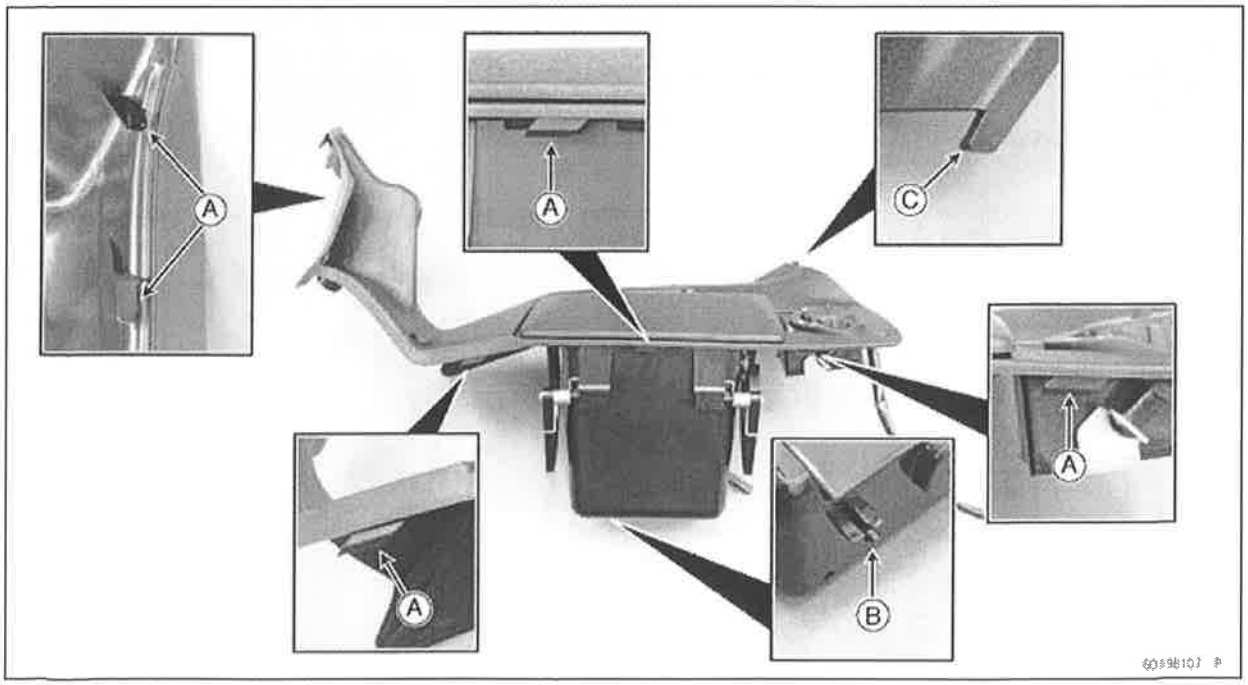
Front Fuel Tank Cover Installation

- Check that the rubber trim [A] is in place on the front fuel tank cover.



Inner Cover Removal

Tabs [A]
Projection [B] (Left Side only)
Hook [C]



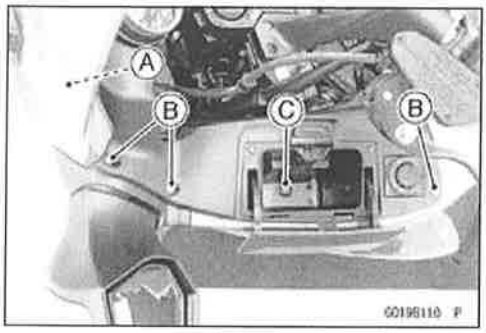
Cover

- Remove:
  Front Fuel Tank Cover (see Front Fuel Tank Cover Removal)
- Turn the key knob to "ON" position.
- Set the windshield position to top by pushing the electric windshield adjusting button.

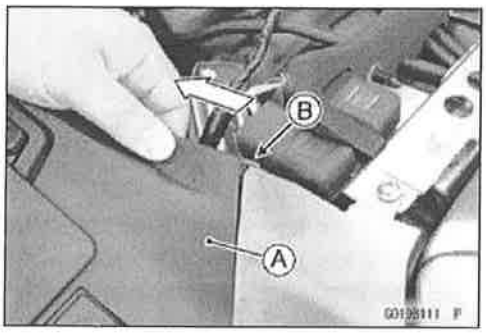
⚠ WARNING

Windshield movement can trap the hands and fingers and cause injury. When the ignition switch is turned to the "OFF" position, the windshield automatically moves to the "basic" (bottom) position. Be sure nobody is adjacent to the windshield when switching the ignition to "OFF."

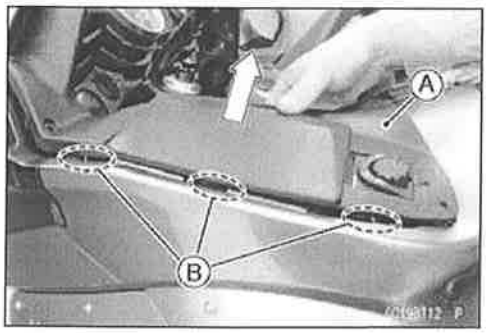
- Open the storage case lid by pushing the release button (left side only).
- Remove:
  Quick Rivet [A]
  Inner Cover Bolt [B]
  Storage Case Bolt [C] (Left Side only)



- Pull the inner cover [A] forward to clear the hook [B] of the inner cover.

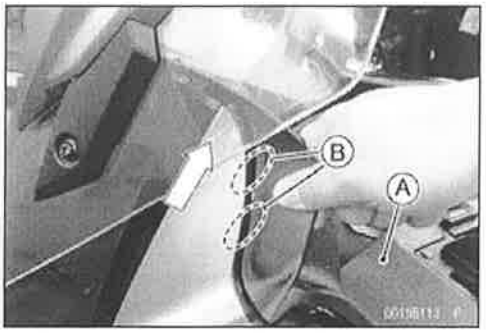


- Pull the inner cover [A] upward to clear the tabs [B] of the inner cover.



Cover

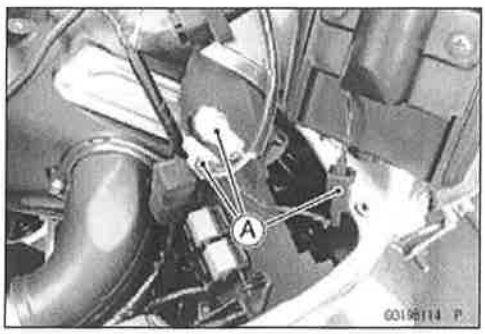
- Pull the inner cover [A] upward to clear the tabs [B] of the inner cover.



- Disconnect the connectors [A] (left side only).
- Remove the inner cover.
- Turn the key knob to "OFF" position.

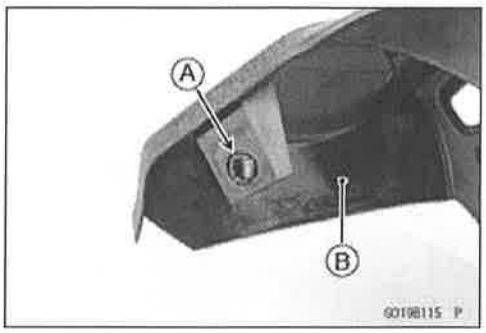
NOTE

○*If the ignition switch is on for an extended time, the battery may become totally discharged.*

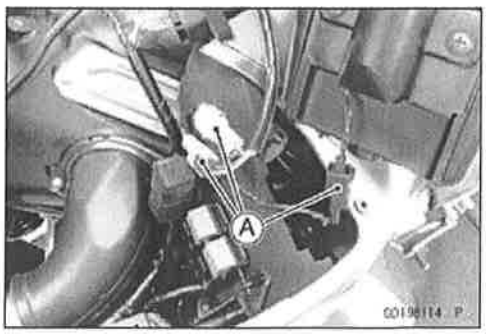


Inner Cover Installation

- Check that the collar rivet [A] is in place on the inner cover [B].



- Connect the connectors [A] securely.
- Turn the key knob to "ON" position.
- Set the windshield position to top by pushing the electric windshield adjusting button.

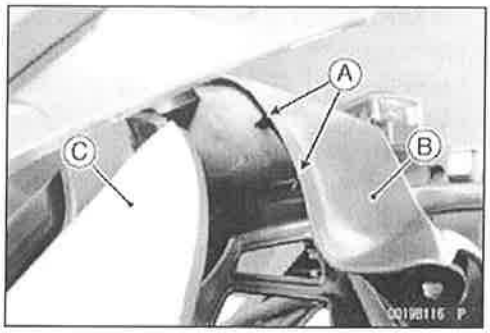


⚠ WARNING

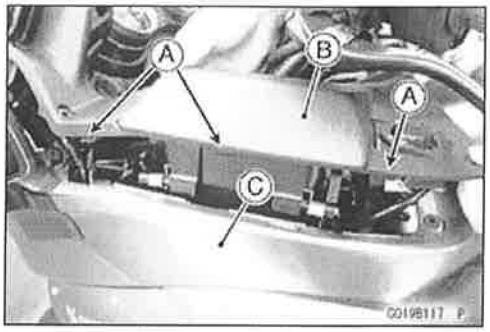
Windshield movement can trap the hands and fingers and cause injury. When the ignition switch is turned to the "OFF" position, the windshield automatically moves to the "basic" (bottom) position. Be sure nobody is adjacent to the windshield when switching the ignition to "OFF."

Cover

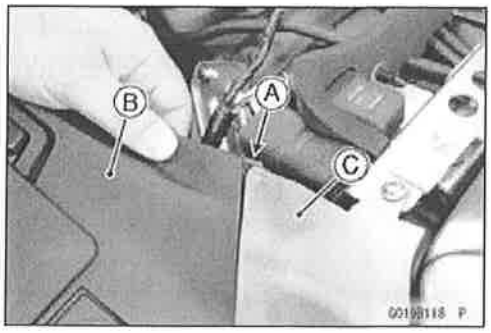
- Insert the tabs [A] of the inner cover [B] into the inside of the upper fairing [C].



- Insert the tabs [A] of the inner cover [B] into the inside of the rear middle fairing [C].



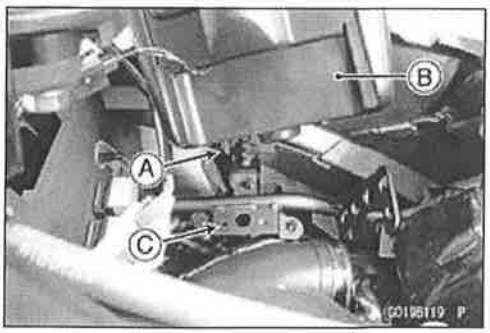
- Insert the hook [A] of the inner cover [B] into the inside of the rear middle fairing [C].



- Open the storage case lid by pushing the release button.
- Insert the projection [A] of the inner cover [B] into the hole [C] of the bracket.

NOTE

○*In this photo, the inner cover has been removed for clarity.*



- Tighten:

Torque - Storage Case Bolt: 4.0 N·m (0.41 kgf·m, 35 in·lb)
Inner Cover Bolts: 0.50 N·m (0.05 kgf·m, 4.4 in·lb)

- Install the quick rivet.
- Turn the key knob to "OFF" position.

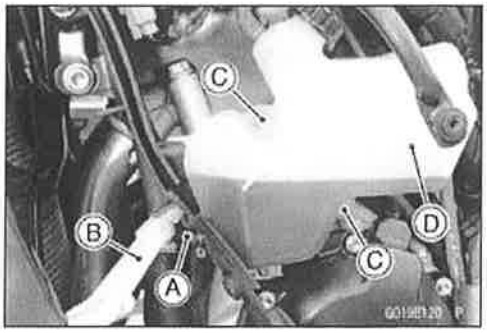
NOTE

○*If the ignition switch is on for an extended time, the battery may become totally discharged.*

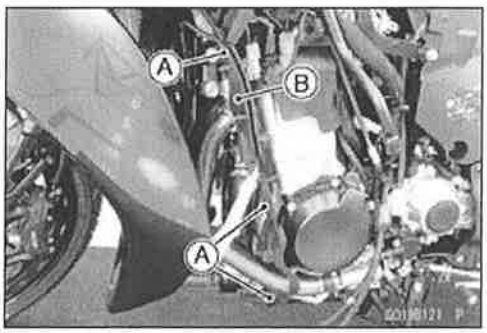
Cover

Left Inner Rubber Cover Removal

- Remove:
  Left Lower Fairing (see Lower Fairing Removal)
  Left Rear Middle Fairing (see Rear Middle Fairing Removal)
- Clamp the coolant hose [A] with the suitable clamper [B].
- Remove the coolant reserve tank bolts [C].
- Remove the coolant reserve tank [D] by pulling out the hose with water remains in the reservoir.



- Remove:
  Quick Rivets [A]
  Left Inner Rubber Cover [B]

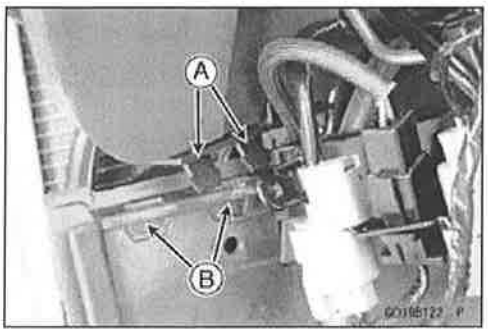


Left Inner Rubber Cover Installation

- Insert the hooks [A] of the radiator cover into the slots [B] of the rubber cover.
- Set the quick rivets and push the core of them.
- Install the coolant reserve tank.
- Apply a non-permanent locking agent to the threads of the coolant reserve tank bolts.
- Tighten:

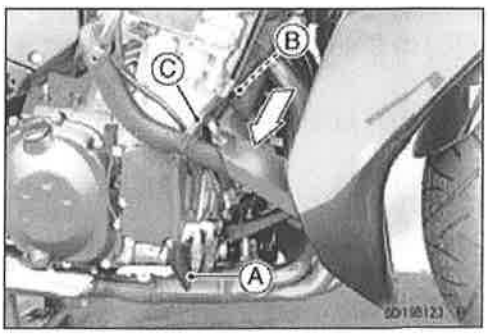
  Torque - Coolant Reserve Tank Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)

- Install the removed parts (see appropriate chapters).



Right Inner Rubber Cover Removal

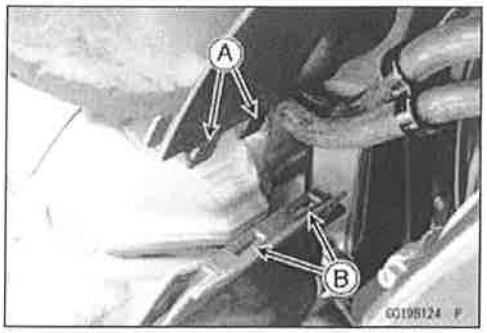
- Remove:
  Right Lower Fairing (see Lower Fairing Removal)
  Right Rear Middle Fairing (see Rear Middle Fairing Removal)
  Quick Rivet [A]
- Pull the right inner rubber cover [B], to clear the projection [C] of the right inner rubber cover from the hole of engine.
- Remove the right inner rubber cover.



Cover

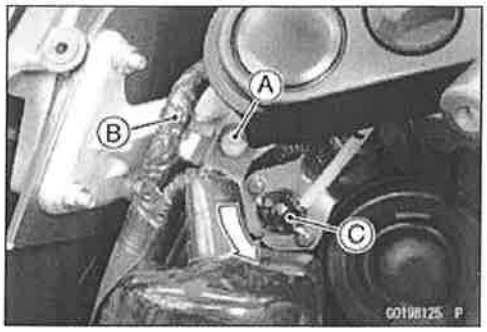
Right Inner Rubber Cover Installation

- Insert the projection of the rubber cover into the hole of the engine.
- Insert the hooks [A] of the radiator cover into the slots [B] of the rubber cover.
- Install the quick rivet.
- Install the removed parts (see appropriate chapters).



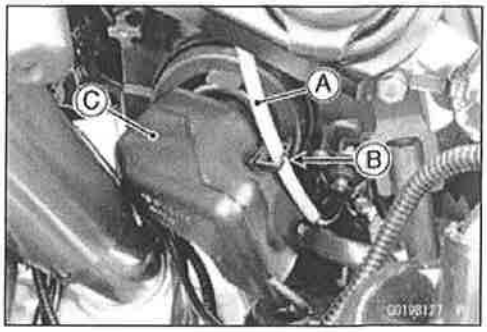
Meter Cover Removal

- Remove:
  Meter Unit (see Meter Unit Removal in the Electrical System chapter)
  Inner Covers (see Inner Cover Removal)
  Fairings Stay Bolt [A]
- Open the clamp [B].
- Turn the fitting [C] of the headlight aiming cable counterclockwise and remove it.

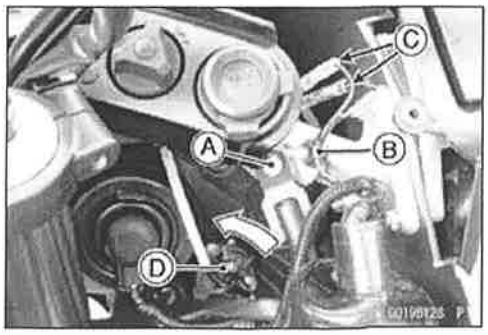


- Remove:
  Resonator Bolt [A] (Right Side only)

- Free the right headlight aiming cable [A] from the clamp [B] of the right resonator [C].
- Remove the right resonator.

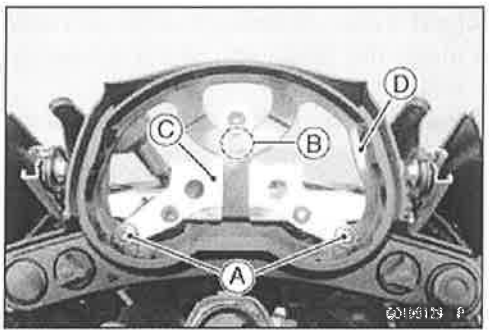


- Remove the fairing stay bolt [A].
- Open the clamp [B].
- Disconnect the DC 12 V accessory socket lead connectors [C].
- Turn the fitting [D] of the headlight aiming cable counterclockwise and remove it.

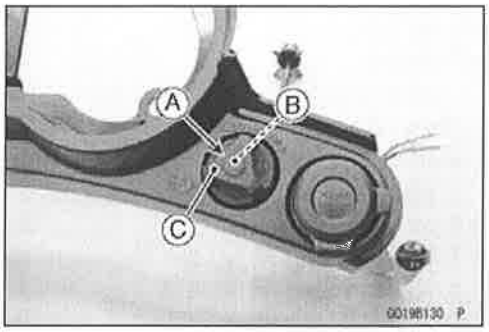


Cover

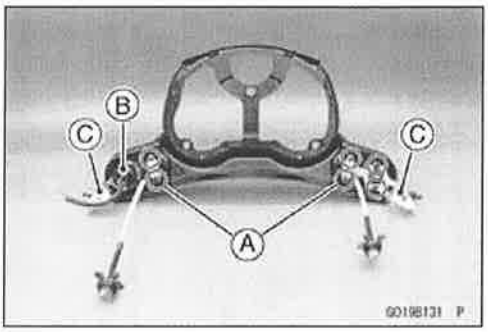
- Remove:
  Meter Cover Bolts [A] and Collars
- Clear the hook [B] of the meter cover from the bracket [C] to remove the meter cover [D].



- Remove (Both Sides):
  Cap [A]
  Headlight Aiming Adjuster Bolt [B]
  Headlight Aiming Adjuster [C]



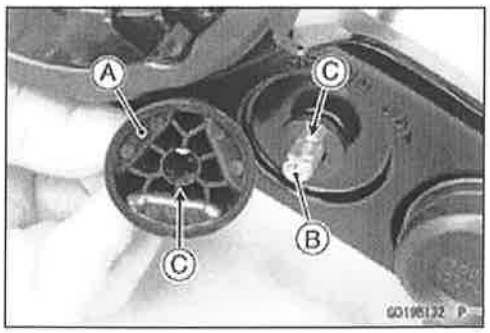
- Remove:
  Headlight Aiming Adjuster Bracket Screws [A]
  Ring Nut [B]
  Brackets [C]



Meter Cover Installation

- Installation is reverse of removal.
- Insert the knob [A] onto the cable end [B] so that the each flat faces [C] are fit.

Torque - Headlight Aiming Adjuster Bracket Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)
Headlight Aiming Adjuster Bolts: 1.5 N·m (0.15 kgf·m, 13 in·lb)
Meter Cover Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)

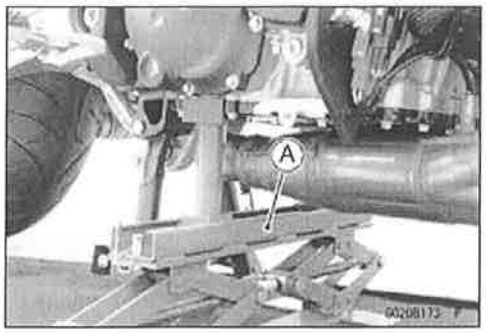


Center Stand, Side Stand

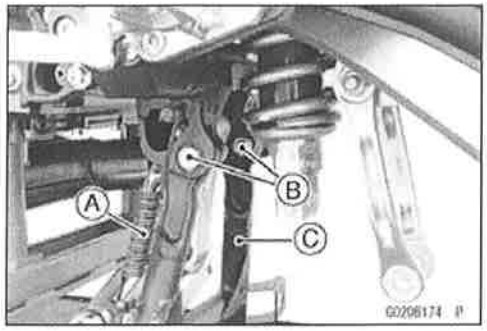
Center Stand Removal

- Remove:
  Muffler Body (see Muffler Body Removal in the Engine Top End chapter)
- Raise the rear wheel off the ground with the jack [A].

Special Tool - Jack: 57001-1238



- Remove:
  Lower Tie-Rod Bolt (see Tie-Rod Removal in the Suspension chapter)
  Lower Rear Shock Absorber Bolt (see Rear Shock Absorber Removal in the Suspension chapter)
  Spring [A]
  Center Stand Bolts [B] and Nuts
  Center Stand [C]



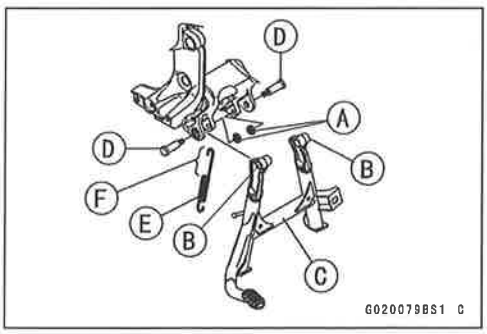
Center Stand Installation

- Replace the center stand nuts [A] with new ones.
- Apply grease to the sliding area [B] of the center stand [C].
- Tighten:

Torque - Center Stand Bolts [D]: 45 N·m (4.6 kgf·m, 33 ft·lb)

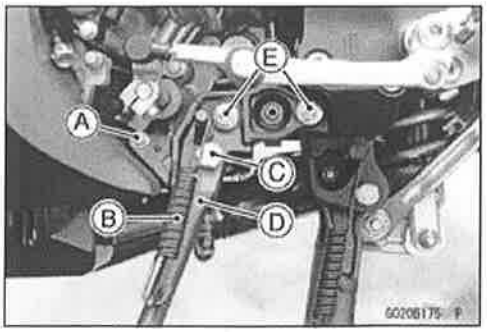
- Hook the spring [E] so that the long end [F] of it faces upward.

○Install the spring hook direction as shown.



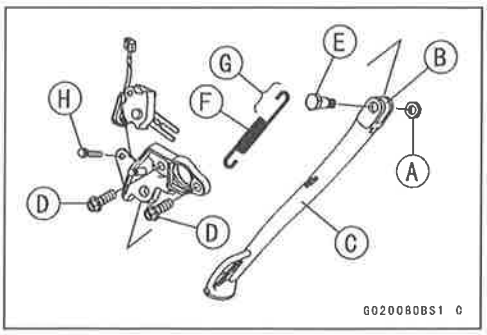
Side Stand Removal

- Use the center stand to support the motorcycle upright.
- Remove:
  Side Stand Switch Bolt [A]
  Spring [B]
  Side Stand Bolt [C] and Nut
  Side Stand [D]
  Side Stand Bracket Bolts [E]



Center Stand, Side Stand

Side Stand Installation



- Replace the side stand nut [A] with a new one.
- Apply grease to the sliding area [B] of the side stand [C].
- Apply a non-permanent locking agent to the bracket bolts [D].
- Tighten the side stand bolt [E] first, and then the side stand nut.

Torque - Side Stand Bracket Bolts: 50 N·m (5.1 kgf·m, 37 ft·lb)
Side Stand Bolt: 45 N·m (4.6 kgf·m, 33 ft·lb)
Side Stand Nut: 45 N·m (4.6 kgf·m, 33 ft·lb)

- Hook the spring [F] so that the long end [G] of it faces upward.

○Install the spring hook direction as shown.

- Install the side stand switch.

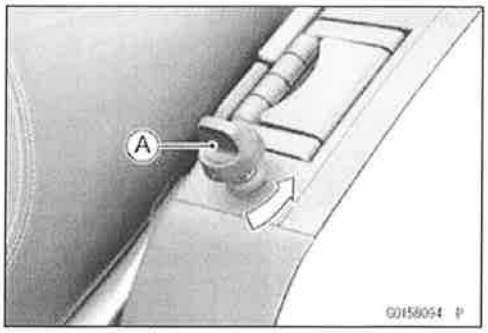
○Apply a non-permanent locking agent to the side stand switch bolt [H], and tighten it.

Torque - Side Stand Switch Bolt: 9.0 N·m (0.92 kgf·m, 80 in·lb)

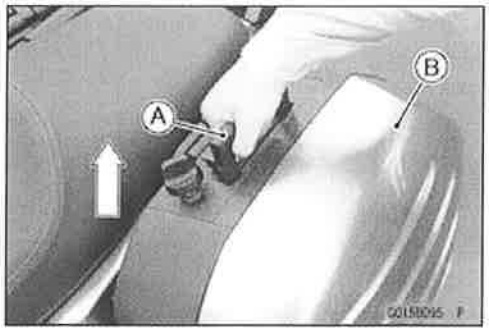
Saddlebag (Accessory)

Saddlebag Removal

- Insert the key knob [A] into the lid lock.
- Turn the key knob to the lever side from the lock mark.



- Pull up the handle [A] on the top of the saddlebag [B].
- Remove the saddlebag by pulling it up.



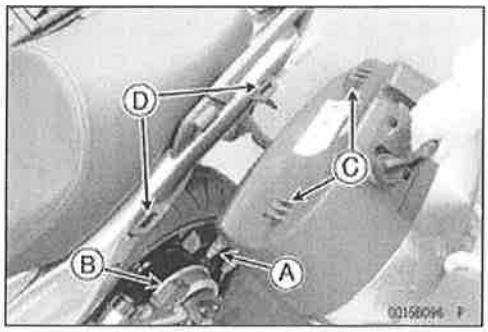
Saddlebag Installation

- Turn the key knob to the lever side from the lock mark.
- While aligning the holder [A] on the below of the saddlebag with the projection [B] on the near of the rear footpeg, insert the hooks [C] on the top of the saddlebag into the holders [D] of the hook bracket.
- Push back the handle to the original position.

NOTE

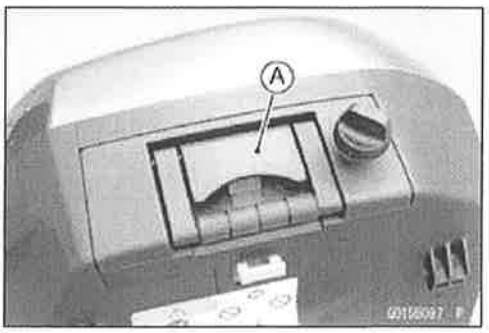
○*Mark sure that the saddlebag and lid are securely locked by pulling the handle, saddlebag, lid, and lever.*

- Remove the key knob.



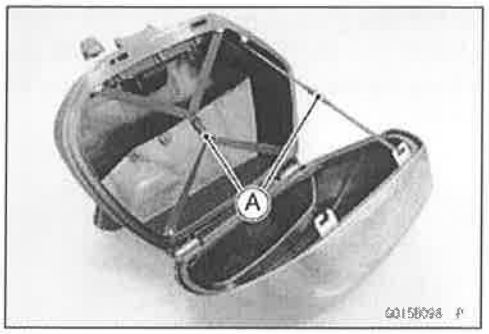
Saddlebag Disassembly

- Remove the saddlebag (see Saddlebag Removal).
- Turn the key knob to the lever side from the lock mark.
- Pull up the lever [A] on the top of the saddlebag.

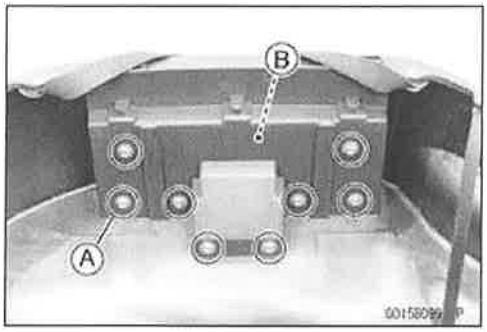


Saddlebag (Accessory)

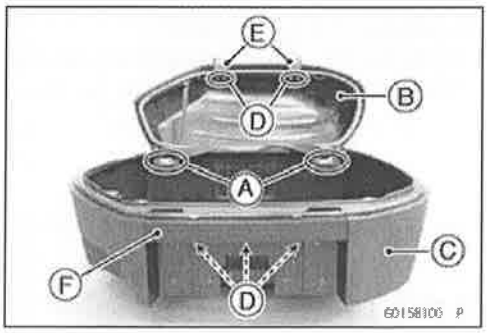
- Unlock the hooks [A] of the band.



- Unscrew the screws [A] of the saddlebag lock assy.
- Remove the saddlebag lock assy [B].



- Unscrew the hinge nuts [A] and separate the lid [B] and case [C].
- Remove:
  Screws [D]
  Hooks [E]
  Lid Cover [F]
- Drill the surface of the rivet using a 1.0 to 1.5 mm (0.039 to 0.059 in.) drill bit



NOTE

○*Stop drilling when the rivet head starts to turn with drill bit.*

- Remove the bands.

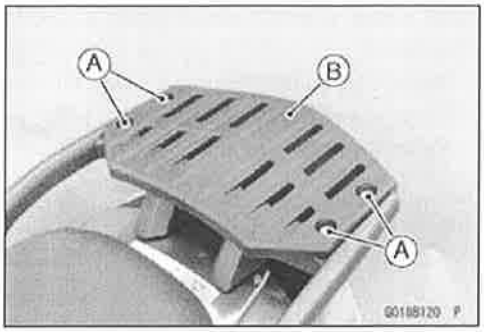
Saddlebag Assembly

- Apply a non-permanent locking agent to the hinge nuts.
- Secure the bands to the case with the rivets using a riveter.

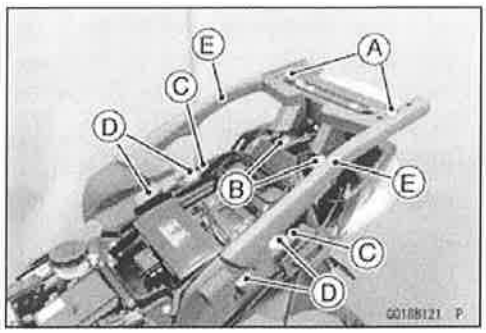
Carrier

Carrier Removal

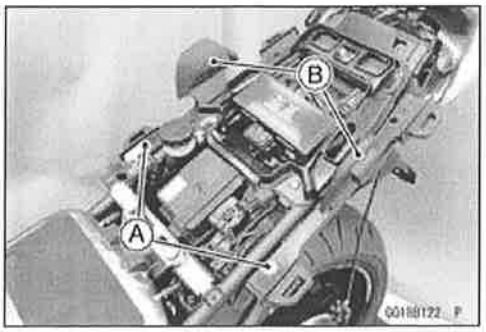
- Remove:
  Saddlebags (see Saddlebag Removal)
  Carrier Plate Bolts [A]
  Carrier Plate [B]



- Remove:
  Seat Covers (see Seat Cover Removal)
  Tail/Brake Light Mounting Bolts [A]
  Carrier Bracket Bolts (M10) [B]
  Carrier Bracket Bolts (M5) [C]
  Carrier Bracket Bolts (M8) [D]
  Carrier Brackets [E]



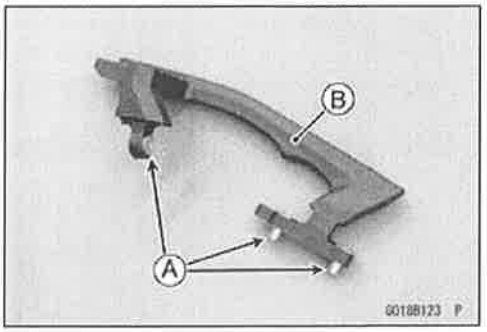
- Remove:
  Hook Bracket Bolts [A]
  Hook Brackets [B]



Carrier Installation

- Installation is the reverse of removal.
- Set the collars [A] before installing the carrier bracket [B].
- Tighten:

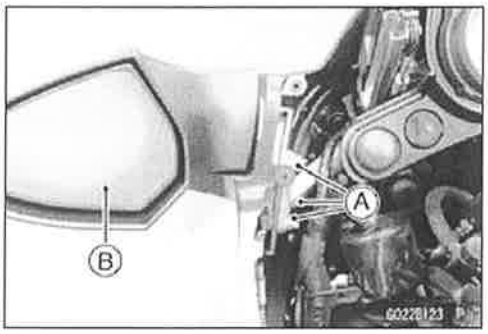
Torque - Hook Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Carrier Bracket Bolts (M10): 35 N·m (3.6 kgf·m, 26 ft·lb)
Carrier Bracket Bolts (M8): 25 N·m (2.5 kgf·m, 18 ft·lb)
Carrier Bracket Bolt (M5): 0.50 N·m (0.05 kgf·m, 4.4 in·lb)
Tail/Brake Light Mounting Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)
Carrier Plate Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)



Rear View Mirror

Rear View Mirror Removal

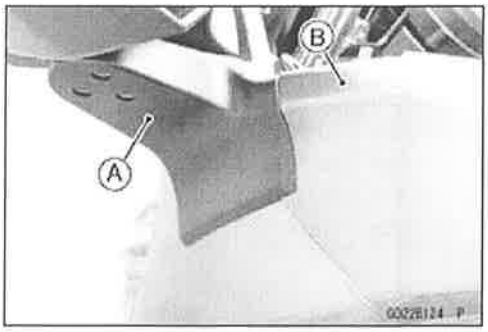
- Remove:
  Inner Cover (see Inner Cover Removal)
  Rear View Mirror Nuts [A]
  Rear View Mirror [B]



Rear View Mirror Installation

- Installation is the reverse of removal.
- Check the rear view mirror [A] is flush with the surface of the rear middle fairing [B].
- Tighten:

Torque - Rear View Mirror Nuts: 8.0 N·m (0.82 kgf·m, 71 in·lb)



Rear View Mirror

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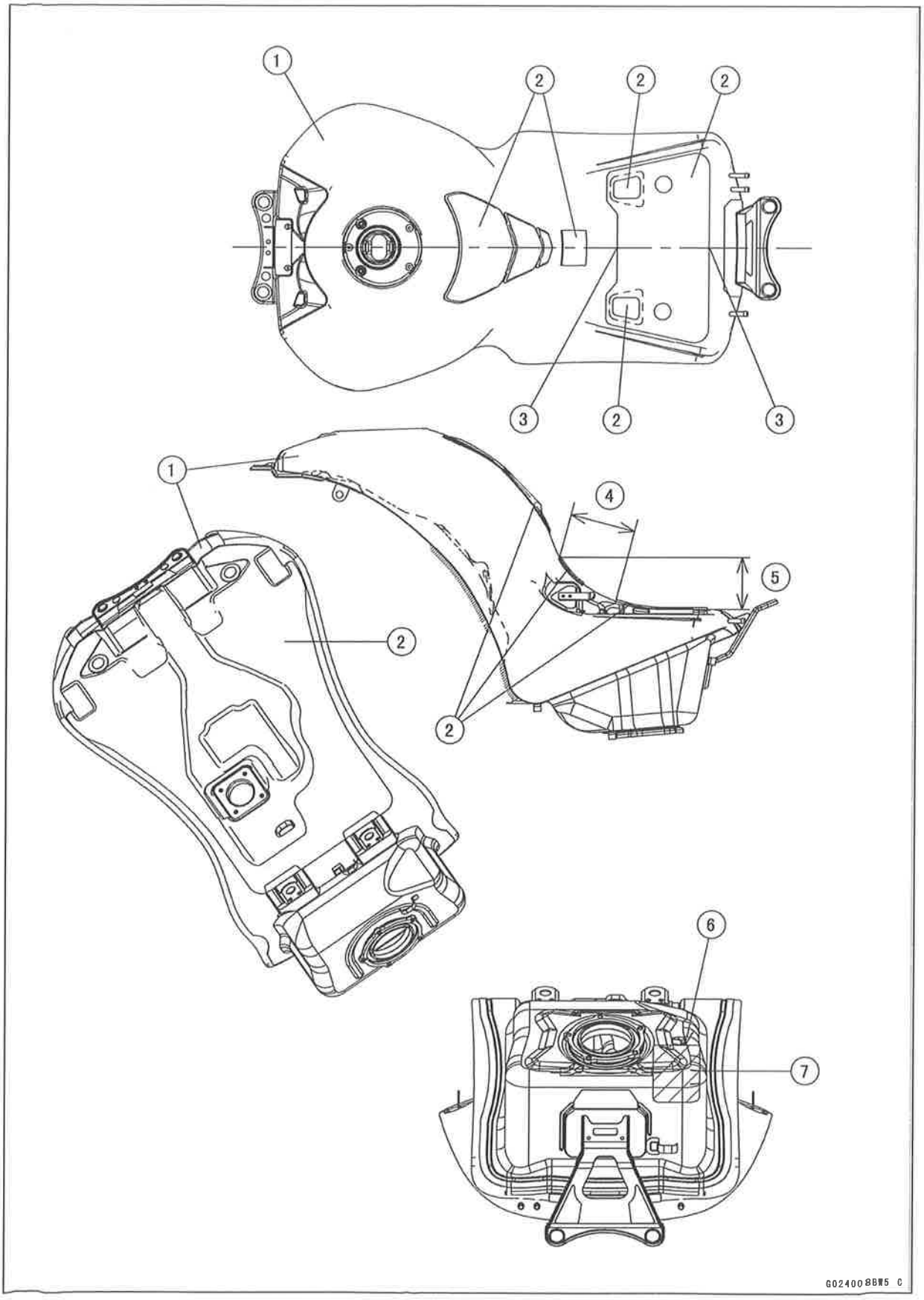
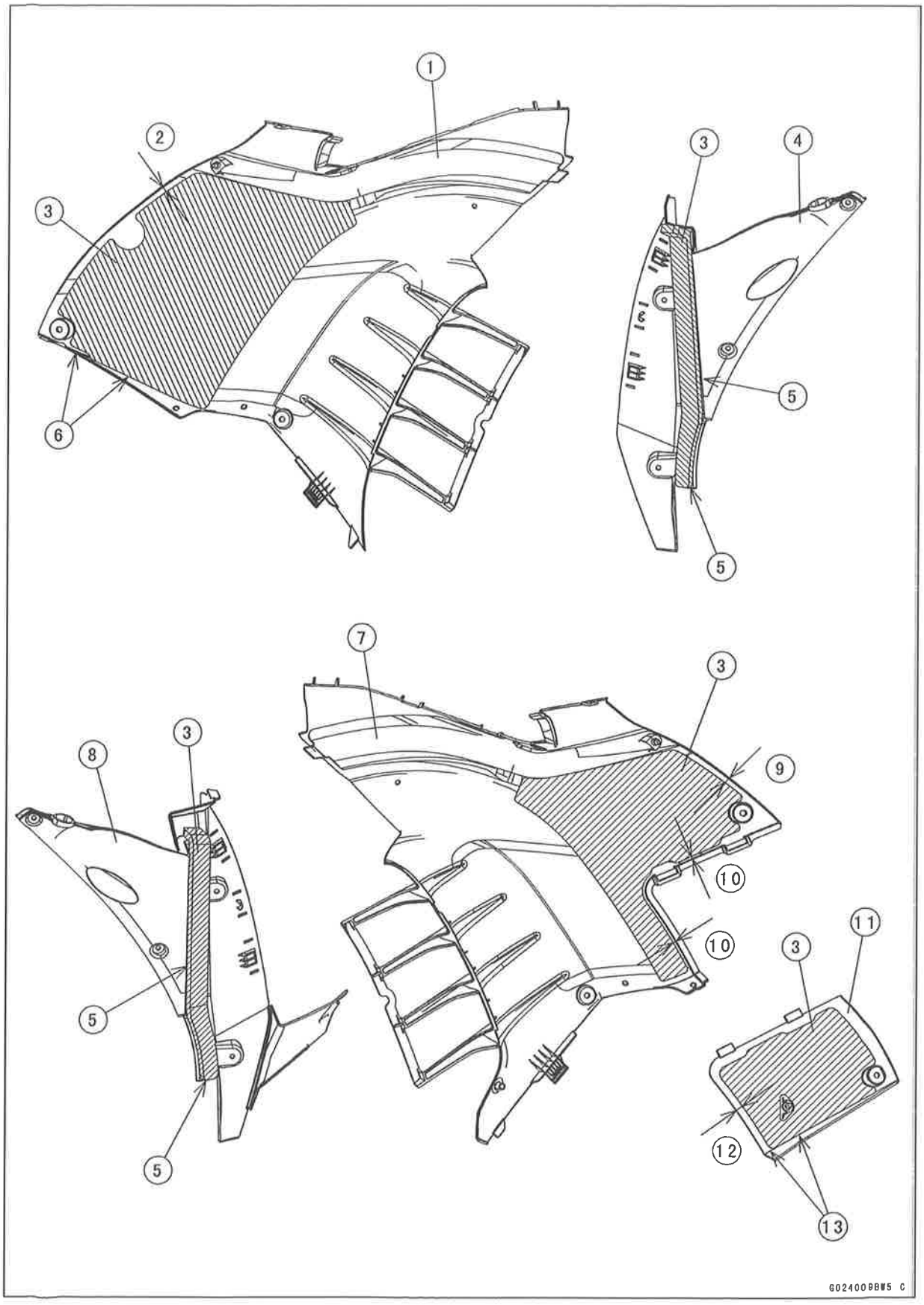
Pads



Pads

1. Fuel Tank
2. Pads
3. Align the notch of the pad with weld of the fuel tank.
4. Approx. 19 mm (0.75 in.)
5. Approx. 15.1 mm (0.594 in.)
6. Align the guard with dent of the fuel tank.
7. Guard

Pads



Pads

1. Left Rear Middle Fairing
2. 7 ~ 8 mm (0.28 ~ 0.31 in.)
3. Pads
4. Left Front Middle Fairing Inner Cover
5. Follow the shape of the front middle fairing inner cover.
6. Follow the corner of the rear middle fairing.
7. Right Rear Middle Fairing
8. Right Front Middle Fairing Inner Cover
9. 6 ~ 7 mm (0.24 ~ 0.28 in.)
10. 3 ~ 4 mm (0.12 ~ 0.16 in.)
11. Right Cover
12. 9 ~ 10 mm (0.35 ~ 0.39 in.)
13. Follow the corner of the right cover.

Electrical System

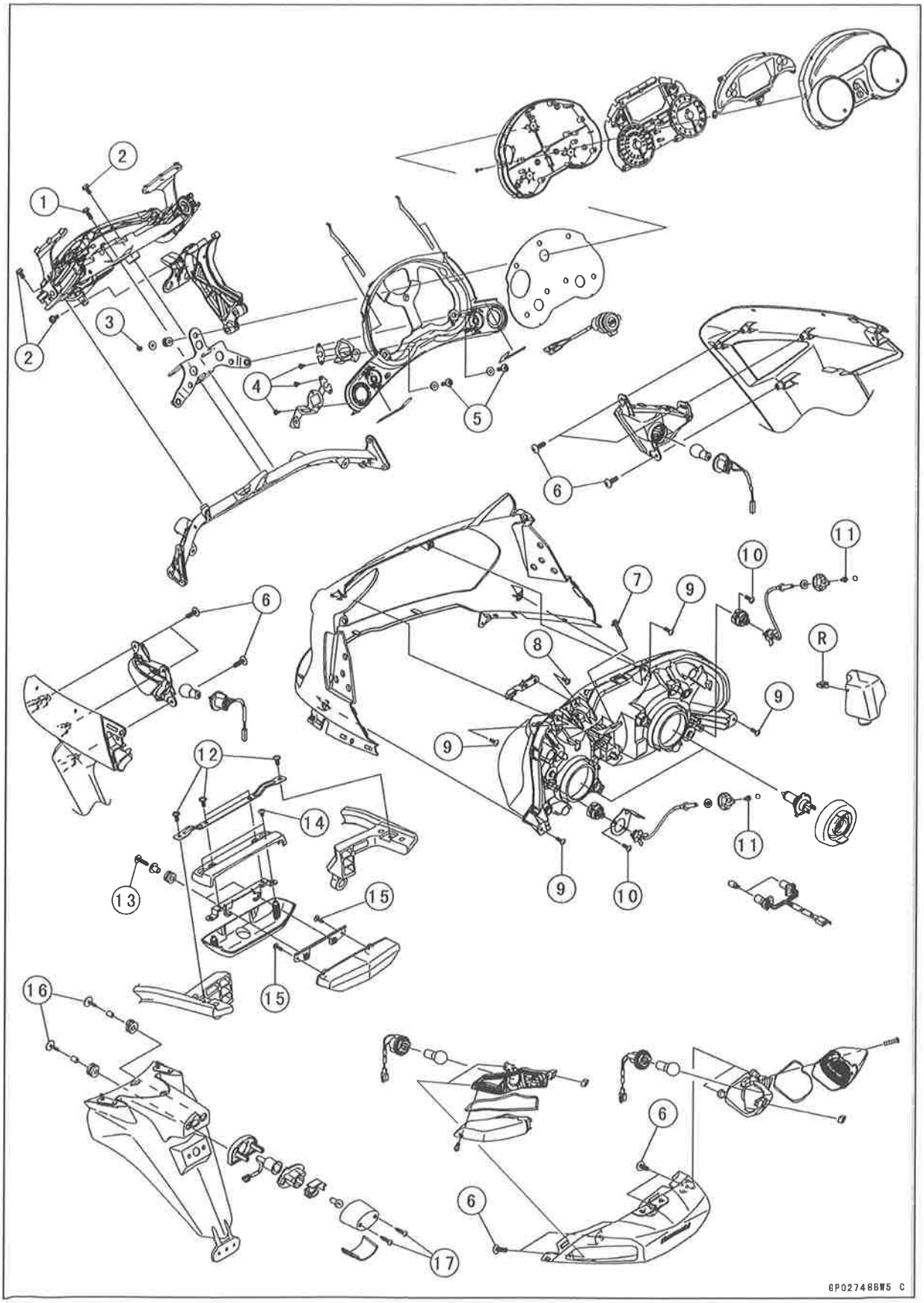
Table of Contents

Exploded View 16-4
Parts Location 16-10
Wiring Diagram 16-14
Specifications 16-18
Special Tools and Sealants 16-20
Precautions 16-22
Electrical Wiring 16-23
  Wiring Inspection 16-23
Battery 16-24
  Battery Removal 16-24
  Battery Installation 16-25
  Battery Activation 16-26
  Precautions 16-29
  Interchange 16-30
  Charging Condition Inspection 16-30
  Refreshing Charge 16-30
Charging System 16-32
  Alternator Cover Removal 16-32
  Alternator Cover Installation 16-33
  Stator Coil Removal 16-33
  Stator Coil Installation 16-33
  Alternator Rotor Removal 16-34
  Alternator Rotor Installation 16-34
  Charging Voltage Inspection 16-35
  Alternator Inspection 16-35
  Regulator/Rectifier Removal 16-37
  Regulator/Rectifier Installation 16-37
  Regulator/Rectifier Inspection 16-37
Ignition System 16-40
  Crankshaft Sensor Removal 16-40
  Crankshaft Sensor Installation 16-40
  Crankshaft Sensor Inspection 16-41
  Crankshaft Sensor Peak Voltage Inspection 16-41
  Timing Rotor Removal 16-42
  Timing Rotor Installation 16-42
  Stick Coil Removal 16-42
  Stick Coil Installation 16-43
  Stick Coil Inspection 16-44
  Stick Coil Primary Peak Voltage Inspection 16-44
  Spark Plug Removal 16-45
  Spark Plug Installation 16-45
  Spark Plug Condition Inspection 16-45
  Camshaft Position Sensor Removal 16-45
  Camshaft Position Sensor Installation 16-47
  Camshaft Position Sensor Inspection 16-47
  Camshaft Position Sensor Peak Voltage Inspection 16-48
  Interlock Operation Inspection 16-48
  IC Igniter Inspection 16-49
Electric Starter System 16-52
  Starter Motor Removal 16-52

Starter Motor Installation 16-52
Starter Motor Disassembly 16-53
Starter Motor Assembly 16-53
Brush Inspection 16-55
Commutator Cleaning and Inspection 16-55
Armature Inspection 16-55
Brush Lead Inspection 16-56
Right-hand End Cover Assembly Inspection 16-56
Starter Relay Inspection 16-56
Lighting System 16-58
Headlight Beam Horizontal Adjustment 16-58
Headlight Beam Vertical Adjustment 16-58
Headlight Bulb Replacement 16-58
City Light Bulb Replacement 16-59
Headlight Removal 16-59
Headlight Installation 16-60
Headlight Relay Inspection 16-60
Tail/Brake Light (LED) Removal 16-61
Tail/Brake Light (LED) Installation 16-62
License Plate Light Bulb Replacement 16-62
Turn Signal Light Bulb Replacement 16-65
Turn Signal Relay Inspection 16-66
Air Switching Valve 16-69
Air Switching Valve Operation Test 16-69
Air Switching Valve Unit Test 16-69
Radiator Fan System 16-71
Fan Motor Inspection 16-71
Oil Control Solenoid Valve 16-72
Oil Control Solenoid Valve Inspection 16-72
Electric Windshield 16-73
Electric Windshield Assembly Removal 16-73
Electric Windshield Assembly Installation 16-73
Electric Windshield Assembly Lubrication 16-74
Electric Windshield Relay Inspection 16-74
Electric Windshield Inspection 16-75
Storage Case Solenoid 16-77
Storage Case Solenoid Removal 16-77
Storage Case Solenoid Installation 16-78
Storage Case Solenoid Inspection 16-78
Grip Warmer 16-80
Grip Warmer Removal 16-80
Grip Warmer Installation 16-81
Grip Warmer Inspection 16-83
Grip Warmer Temperature Adjustment Dial Removal 16-84
Grip Warmer Temperature Adjustment Dial Installation 16-84
Grip Warmer Temperature Adjustment Dial Inspection 16-84
Grip Warmer Relay Inspection 16-85
Grip Warmer System Inspection 16-85
Meter, Gauge, Indicator Unit 16-87
Meter Unit Removal 16-87
Meter Unit Installation 16-87
Meter Unit Disassembly 16-88
Meter Operation Inspection 16-88
Meter System Inspection 16-96
Meter Unit Inspection 16-100
KIPASS 16-106
FOB Operational Cautions 16-106

Key Registration 16-106
KIPASS ECU Power Supply Inspection 16-106
Steering Lock Unit Replacement 16-108
KIPASS ECU Replacement 16-108
KIPASS Signal Relay Inspection 16-108
KIPASS Signal Diode Inspection 16-109
Switches and Sensors 16-111
Brake Light Timing Inspection 16-111
Brake Light Timing Adjustment 16-111
Switch Inspection 16-111
Water Temperature Sensor Inspection 16-112
Speed Sensor Removal 16-112
Speed Sensor Installation 16-112
Speed Sensor Inspection 16-113
Fuel Level Sensor Inspection 16-113
Fuel Reserve Switch Inspection 16-114
Gear Position Switch Removal 16-115
Gear Position Switch Installation 16-116
Gear Position Switch Inspection 16-116
Outside Temperature Sensor Removal 16-117
Outside Temperature Sensor Installation 16-117
Outside Temperature Sensor Inspection 16-117
Oxygen Sensor Removal 16-117
Oxygen Sensor Installation 16-118
Oxygen Sensor Inspection 16-118
Oxygen Sensor Heater Inspection 16-118
Relay Box and Accessory Relay 16-119
Relay Box Removal 16-119
Relay Circuit Inspection 16-119
Diode Circuit Inspection 16-120
Accessory Relay Inspection 16-120
Fuse 16-121
30 A Main Fuse Removal 16-121
Fuse Box Fuse Removal 16-121
Fuse Installation 16-122
Fuse Inspection 16-122

Exploded View

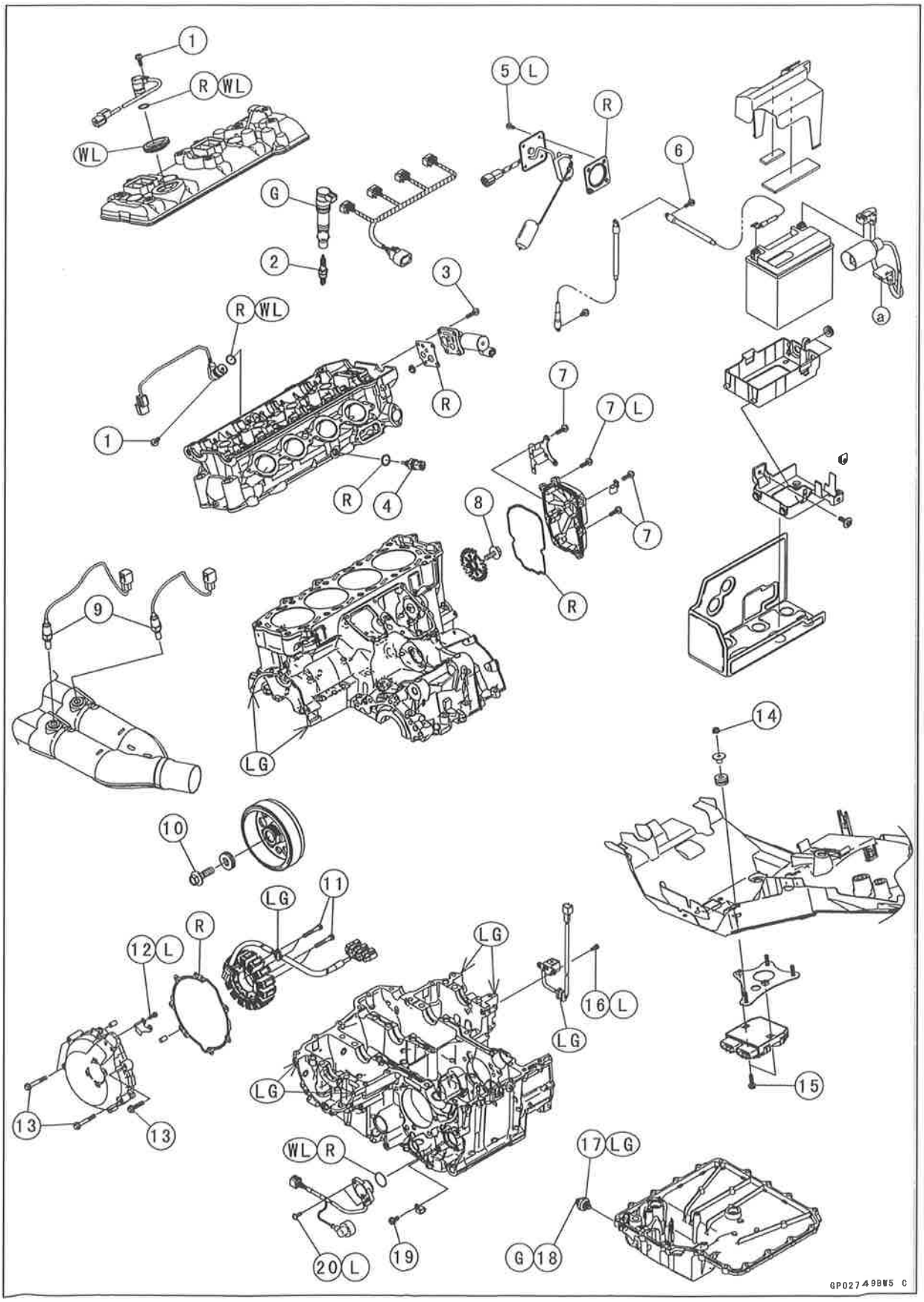


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Electric Windshield Assembly Mounting Bolt (L= 18 mm)	7.0	0.71	62 in·lb	
2	Electric Windshield Assembly Mounting Bolts (L= 12 mm)	8.0	0.82	71 in·lb	
3	Meter Unit Mounting Nuts	4.0	0.41	35 in·lb	
4	Headlight Aiming Adjuster Bracket Screws	1.2	0.12	11 in·lb	
5	Meter Cover Bolts	8.0	0.82	71 in·lb	
6	Turn Signal Light Mounting Screws	1.2	0.12	11 in·lb	
7	Upper Fairing Bolt	4.0	0.41	35 in·lb	
8	Headlight Bracket Screws	1.2	0.12	11 in·lb	
9	Headlight Mounting Screws	3.0	0.31	27 in·lb	
10	Headlight Aiming Cable Bracket Screws	1.5	0.15	13 in·lb	
11	Headlight Aiming Adjuster Bolts	1.5	0.15	13 in·lb	
12	Tail/Brake Light Assembly Mounting Bolts	4.0	0.41	35 in·lb	
13	Tail/Brake Light Mounting Bolts	8.0	0.82	71 in·lb	
14	Tail/Brake Light Cover Bolts	1.2	0.12	11 in·lb	
15	Tail/Brake Light Bracket Screws	1.2	0.12	11 in·lb	
16	License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
17	License Plate Light Cover Mounting Screws	0.90	0.09	8 in·lb	

R: Replacement Parts

Exploded View

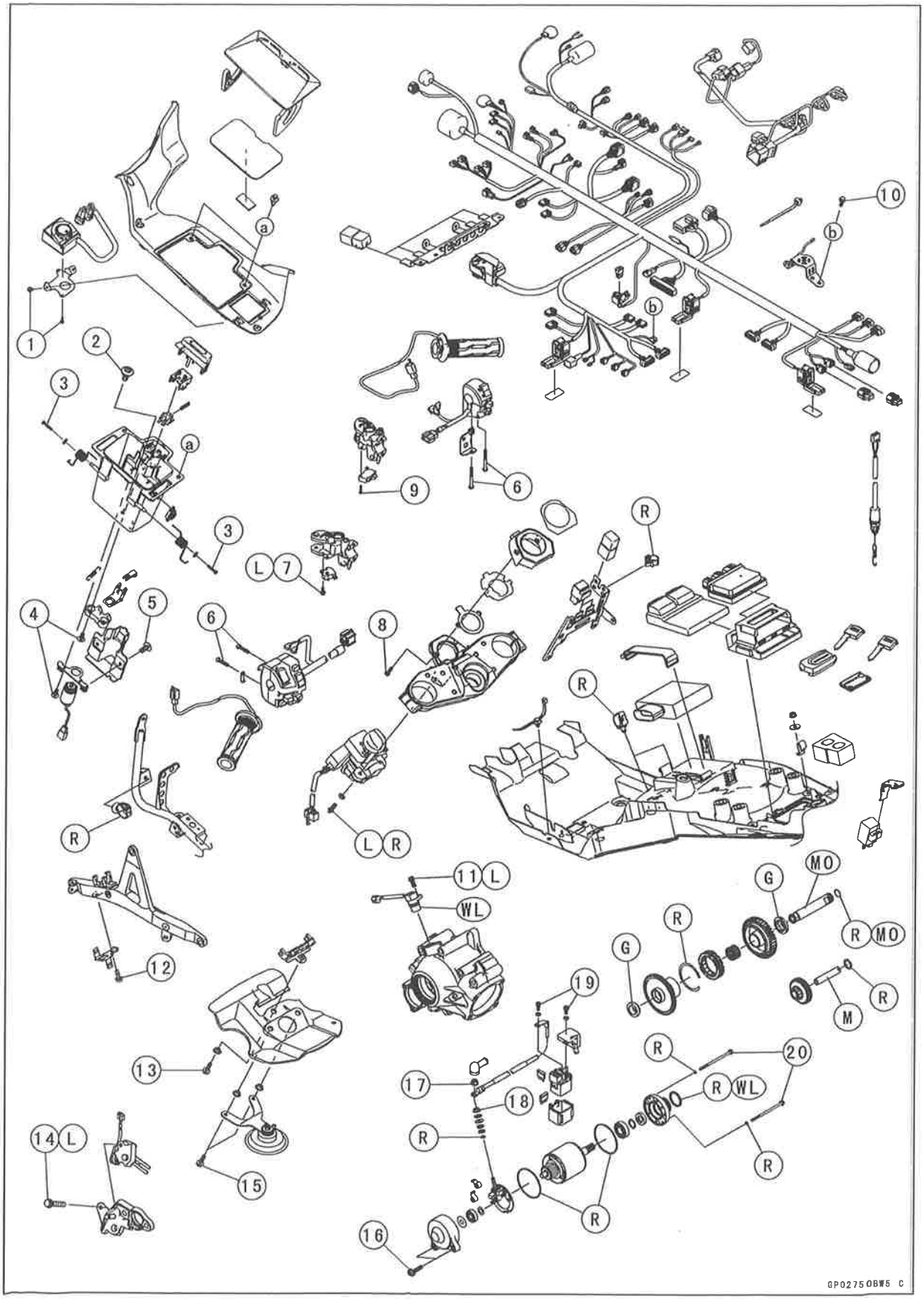


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Camshaft Position Sensor Bolts	9.8	1.0	87 in·lb	
2	Spark Plugs	13	1.3	115 in·lb	
3	Oil Control Solenoid Valve Bolts	9.8	1.0	87 in·lb	
4	Water Temperature Sensor	12	1.2	106 in·lb	
5	Fuel Level Sensor Bolts	7.0	0.71	62 in·lb	L
6	Frame Ground Bolts (L = 16 mm)	7.0	0.71	62 in·lb	
7	Crankshaft Sensor Cover Bolts	9.8	1.0	87 in·lb	L (1)
8	Timing Rotor Bolt	39	4.0	29	
9	Oxygen Sensors	25	2.5	18	
10	Alternator Rotor Bolt	155	15.8	114	
11	Stator Coil Bolts	12	1.2	106 in·lb	
12	Alternator Lead Holding Plate Bolts	7.8	0.80	69 in·lb	L
13	Alternator Cover Bolts	9.8	1.0	87 in·lb	
14	Regulator/Rectifier Bracket Nuts	7.0	0.71	62 in·lb	
15	Regulator/Rectifier Bolts	9.8	1.0	87 in·lb	
16	Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	L
17	Oil Pressure Switch	15	1.5	11	LG
18	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
19	Gear Position Switch Lead Clamp Mounting Bolt	9.8	1.0	87 in·lb	
20	Gear Position Switch Screws	2.9	0.30	26 in·lb	L

G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Exploded View



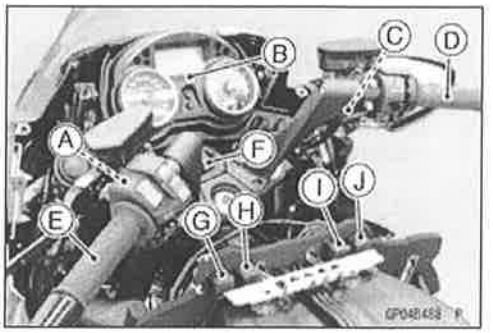
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Grip Warmer Temperature Adjustment Dial Screws	1.2	0.12	11 in·lb	
2	Storage Case Bolt	4.0	0.41	35 in·lb	
3	Storage Case Lid Screws	1.2	0.12	11 in·lb	
4	Storage Case Solenoid Screws	1.2	0.12	11 in·lb	
5	Storage Case Solenoid Cover Screws	3.0	0.31	27 in·lb	
6	Switch Housing Screws	3.5	0.36	31 in·lb	
7	Starter Lockout Switch Screw	0.70	0.07	6.2 in·lb	L
8	Steering Lock Unit Cover Screws	1.2	0.12	11 in·lb	
9	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
10	Frame Ground Bolt (L = 12 mm)	7.0	0.71	62 in·lb	
11	Speed Sensor Bolt	9.8	1.0	87 in·lb	L
12	Connector Bracket Bolt	8.0	0.82	71 in·lb	
13	Steering Stem Cover Bolts	8.0	0.82	71 in·lb	
14	Side Stand Switch Bolt	9.0	0.92	80 in·lb	L
15	Horn Bolts	8.0	0.82	71 in·lb	
16	Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
17	Starter Motor Cable Terminal Nut	5.9	0.60	52 in·lb	
18	Starter Motor Cable Terminal Locknut	6.9	0.70	61 in·lb	
19	Starter Relay Terminal Bolts	3.9	0.40	35 in·lb	
20	Starter Motor Through Bolts	3.4	0.35	30 in·lb	

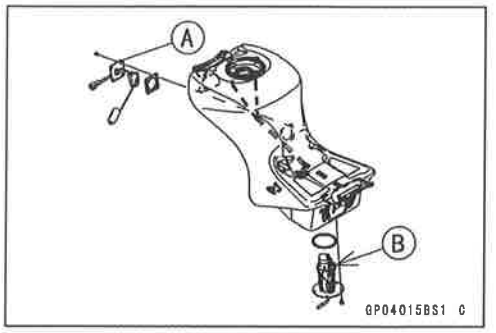
G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight 10 : 1)
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Parts Location

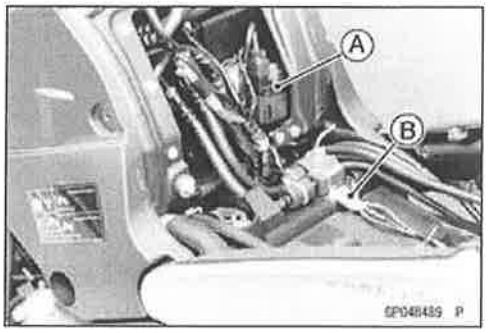
Starter Lockout Switch [A]
Meter Unit [B]
Front Brake Light Switch [C]
Grip Warmer (Right) [D]
Grip Warmer (Left) [E]
Steering Lock Unit [F]
Headlight Relay (Hi) [G]
Headlight Relay (Lo) [H]
KIPASS Signal Relay [I]
Accessory Relay [J]



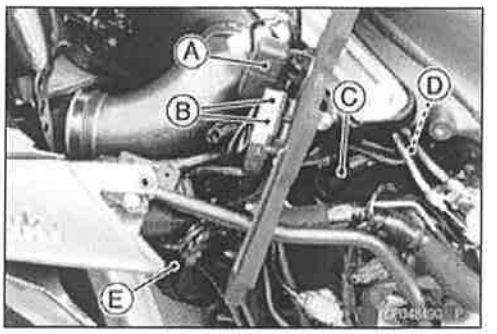
Fuel Level Sensor [A]
Fuel Reserve Switch [B]



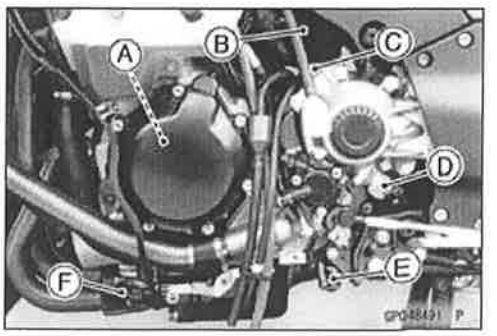
Under Fuel Tank
Starter Relay and Main Fuse 30 A [A]
Frame Ground [B]



Left Side of Vehicle
Grip Warmer Relay [A]
Electric Windshield Relays (Up/Down) [B]
Stick Coils [C]
Intake Camshaft Position Sensor [D]
Fan Motor (Left) [E]



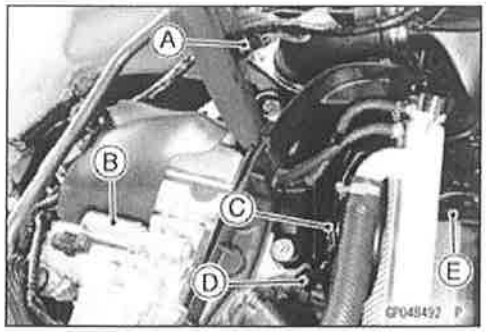
Left Side of Vehicle
Alternator [A]
Starter Motor [B]
Speed Sensor [C]
Gear Position Switch [D]
Side Stand Switch [E]
Oil Pressure Switch [F]



Parts Location

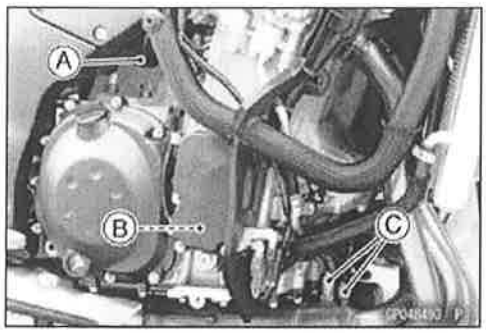
Right Side of Vehicle

KIPASS Signal Diode [A]
Oil Control Solenoid Valve [B]
Fan Motor (Right) [C]
Exhaust Camshaft Position Sensor [D]
Horn [E]



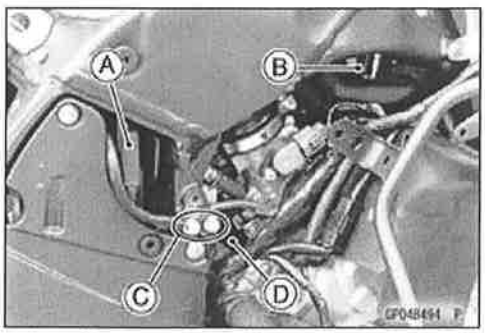
Right Side of Vehicle

Engine Ground [A]
Crankshaft Sensor [B]
Oxygen Sensors [C]



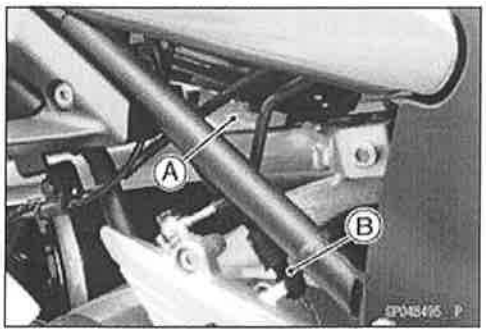
Right Side of Vehicle

Battery 12 V 14 Ah [A]
Air Switching Valve [B]
Frame Grounds [C]
Water Temperature Sensor [D]



Right Side of Vehicle

Regulator/Rectifier [A]
Rear Brake Light Switch [B]

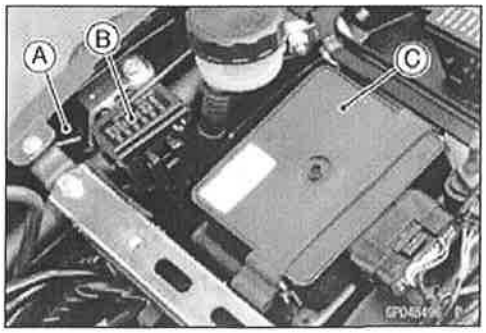


Under Seat

Turn Signal Relay [A]
Fuse Box 1 [B]

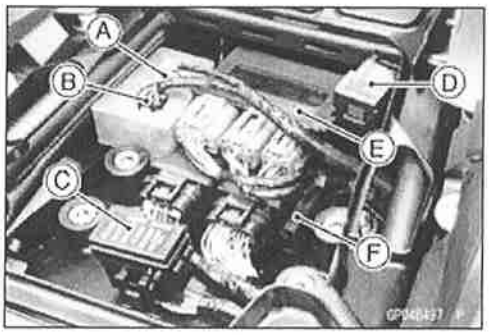
- Turn Signal Relay Fuse 10 A
- Headlight Relay Fuse 10 A
- Taillight Fuse 10 A
- Horn Fuse 10 A
- Headlight Fuse (High) 10 A
- Headlight Fuse (Low) 10 A

KIPASS ECU [C]



Parts Location

Under Seat



KDS Connector [A]
K-ACT ABS KDS Connector [B]
Fuse Box 3 [C]

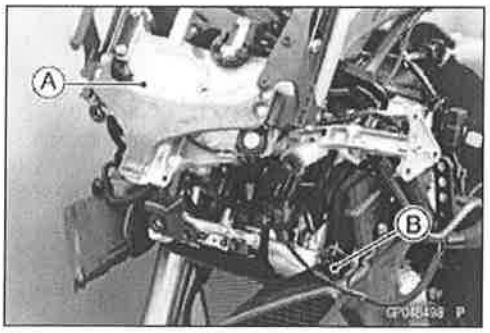
- KIPASS Signal Relay Fuse 10 A
- Oil Control Solenoid Valve Fuse 15 A
- KIPASS Fuse 10 A
- Electric Windshield Fuse 30 A
- Accessory Fuse 5 A
- Grip Warmer Fuse 10 A

Fuse Box 2 [D]

- Fan Fuse 15 A
- ECU Fuse 15 A
- K-ACT ABS Motor Relay Fuse 30 A
- K-ACT ABS Solenoid Valve Relay Fuse 20 A
- Ignition Fuse 15 A

Relay Box [E]
ECU [F]

Back of Headlight



Electric Windshield Motor [A]
Outside Temperature Sensor [B]

Parts Location

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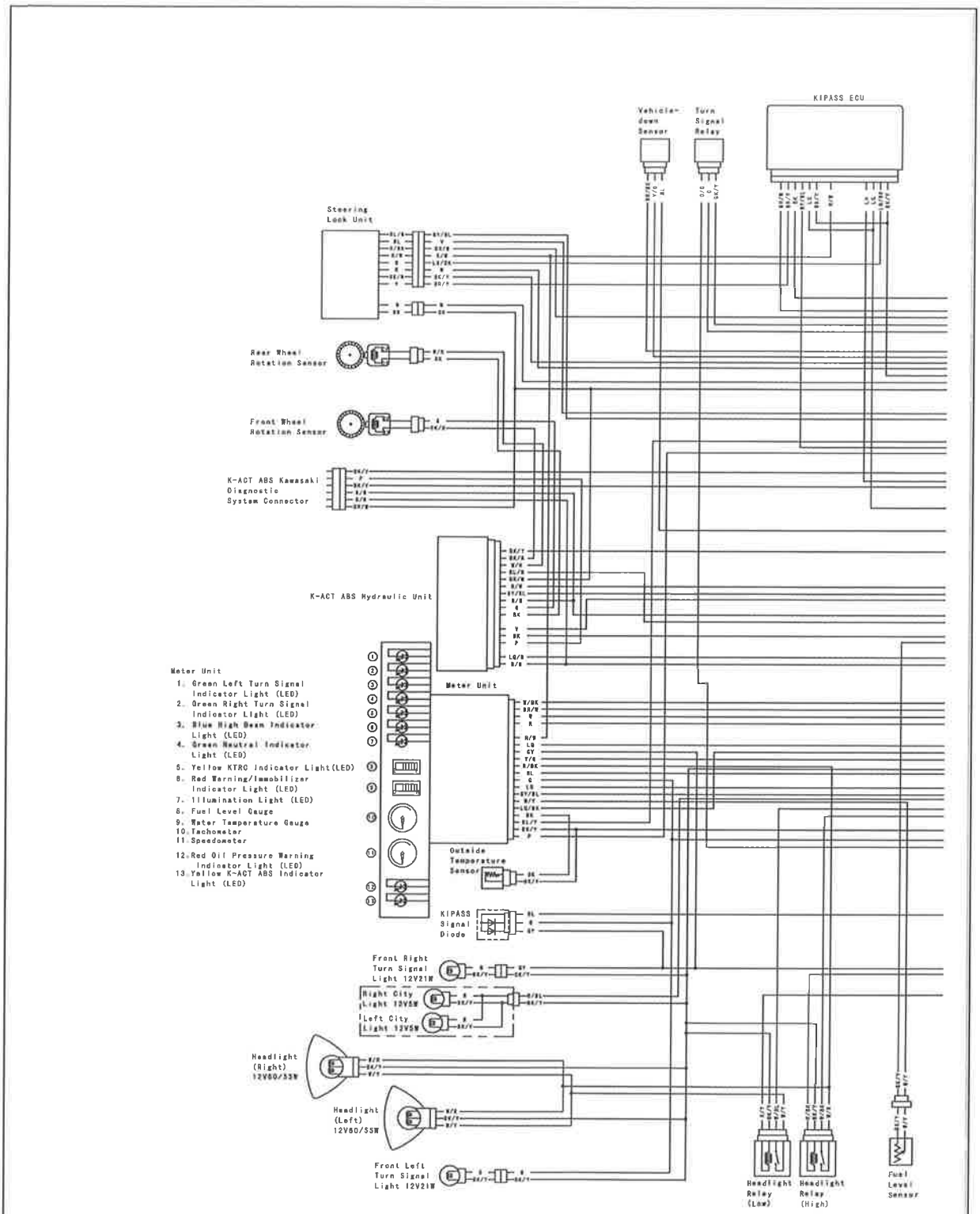
Wiring Diagram

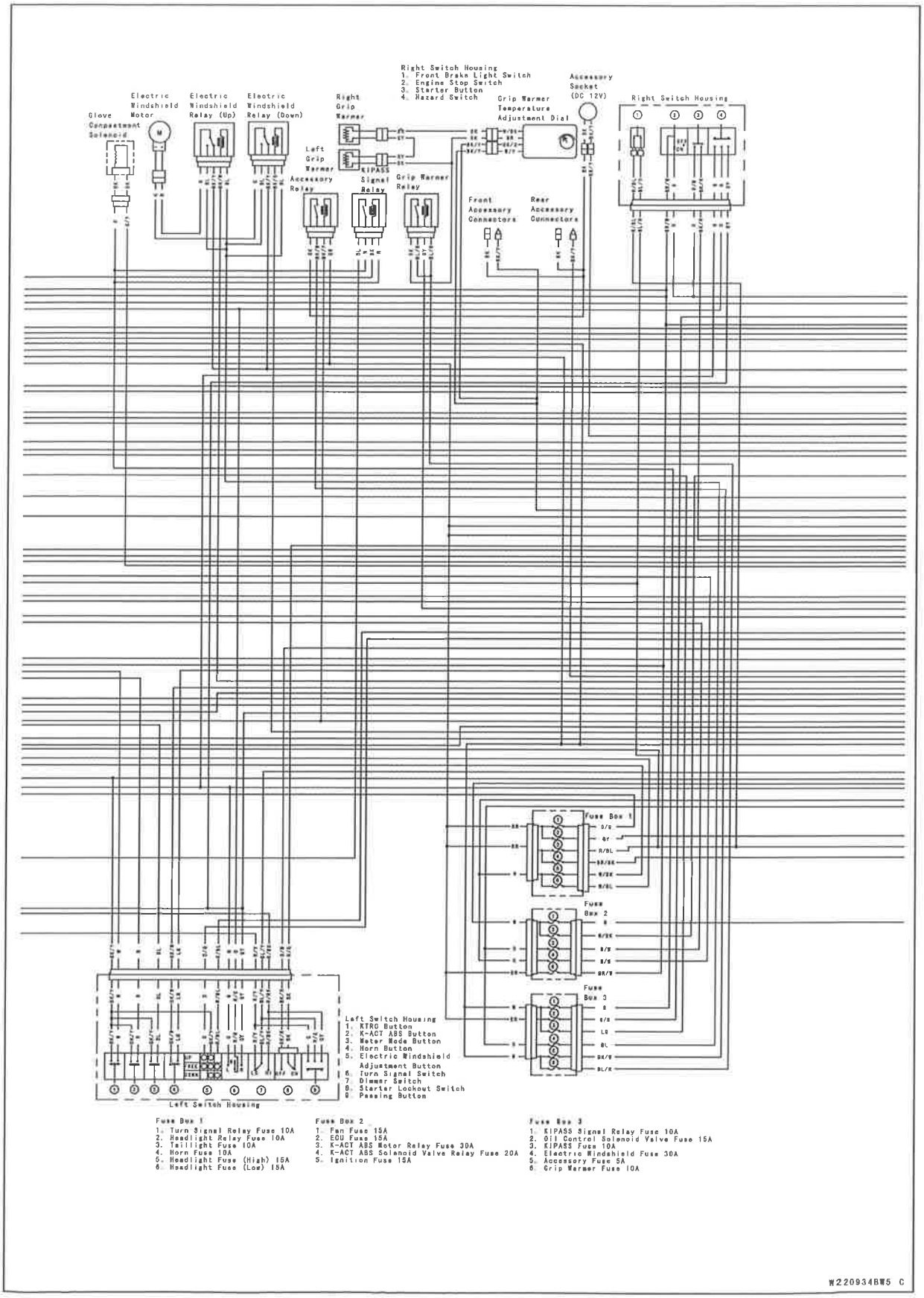

KIPASS ECU
Vehicle-down Sensor
Turn Signal Relay
Steering Lock Unit
Rear Wheel Rotation Sensor
Front Wheel Rotation Sensor
K-ACT ABS Kawasaki Diagnostic System Connector
K-ACT ABS Hydraulic Unit
Meter Unit
Meter Unit
1. Green Left Turn Signal Indicator Light (LED)
2. Green Right Turn Signal Indicator Light (LED)
3. Blue High Beam Indicator Light (LED)
4. Green Neutral Indicator Light (LED)
5. Yellow KTRC Indicator Light (LED)
6. Red Warning/Immobilizer Indicator Light (LED)
7. Illumination Light (LED)
8. Fuel Level Gauge
9. Water Temperature Gauge
10. Tachometer
11. Speedometer
12. Red Oil Pressure Warning Indicator Light (LED)
13. Yellow K-ACT ABS Indicator Light (LED)
Outside Temperature Sensor
KIPASS Signal Diode
Front Right Turn Signal Light 12V21W
Right City Light 12V5W
Left City Light 12V5W
Headlight (Right) 12V60/55W
Headlight (Left) 12V60/55W
Front Left Turn Signal Light 12V21W
Headlight Relay (Low)
Headlight Relay (High)
Fuel Level Sensor

LEFT SWITCH HOUSING CONNECTIONS

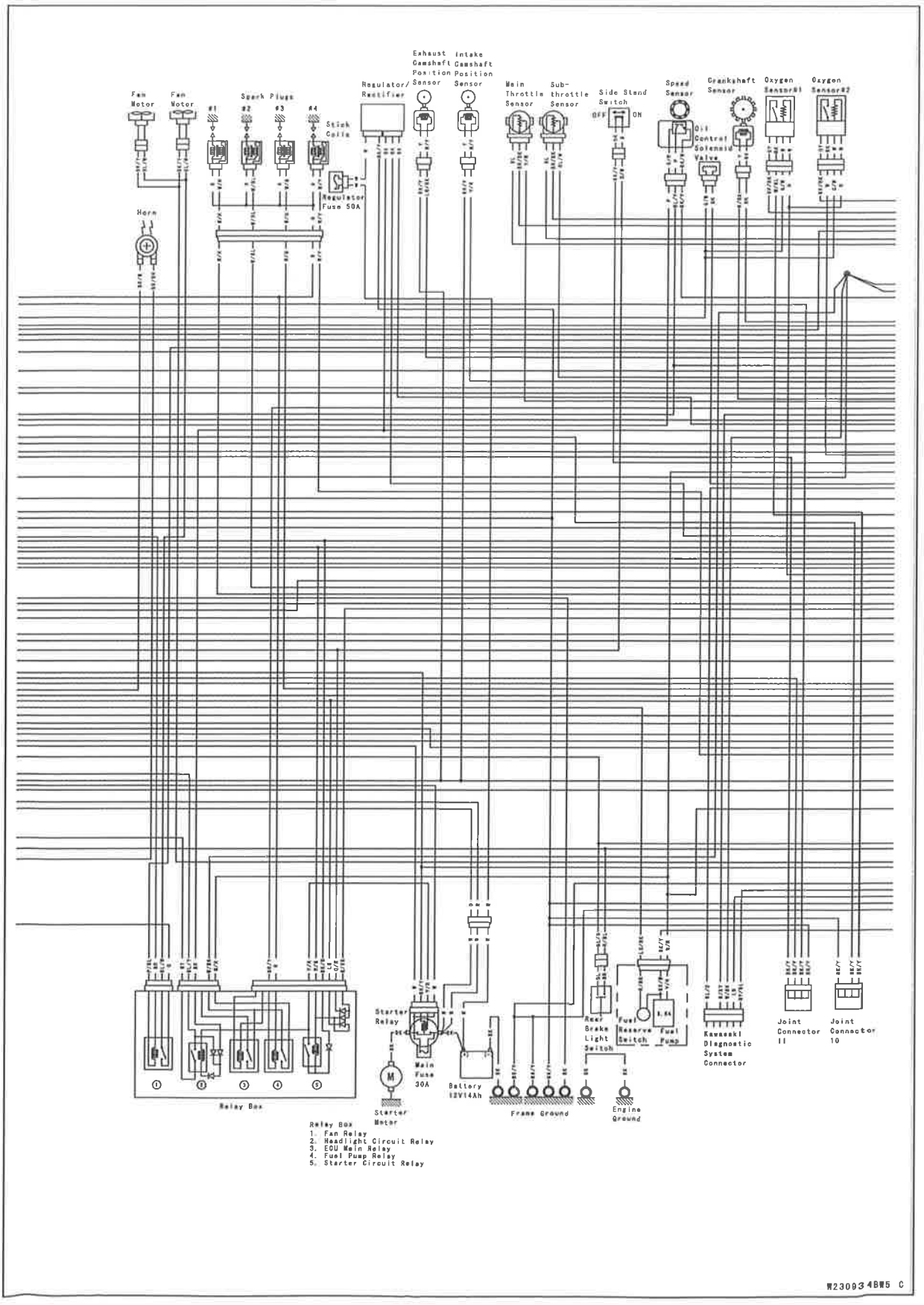
KTRC Button			K-ACT ABS Button			Meter Mode Button			Horn Button			Electric Windshield Adjusting Button				Turn Signal Switch				Dimmer Switch/Passing Button				Starter Lockout Switch		
Color	W	BK/Y	Color	R	BK/Y	Color	BL	BK/Y	Color	BK/W	LB	Color	O	BK/Y	R/BL	Color	G	R/G	GY	Color	R/BK	BL/Y	R/Y	Color	BK	BK/R
Push	○	○	Push	○	○	Push	○	○	Push	○	○	Up	○	○		L	○	○		High	○	○		Clutch Lever		
Released			Released			Released			Released			Free	○	○	○	OFF (Push)				Low		○		Released		
												Down		○		R		○	○	Push	○	○	○	Pulled In	○	

W210934BW5 C

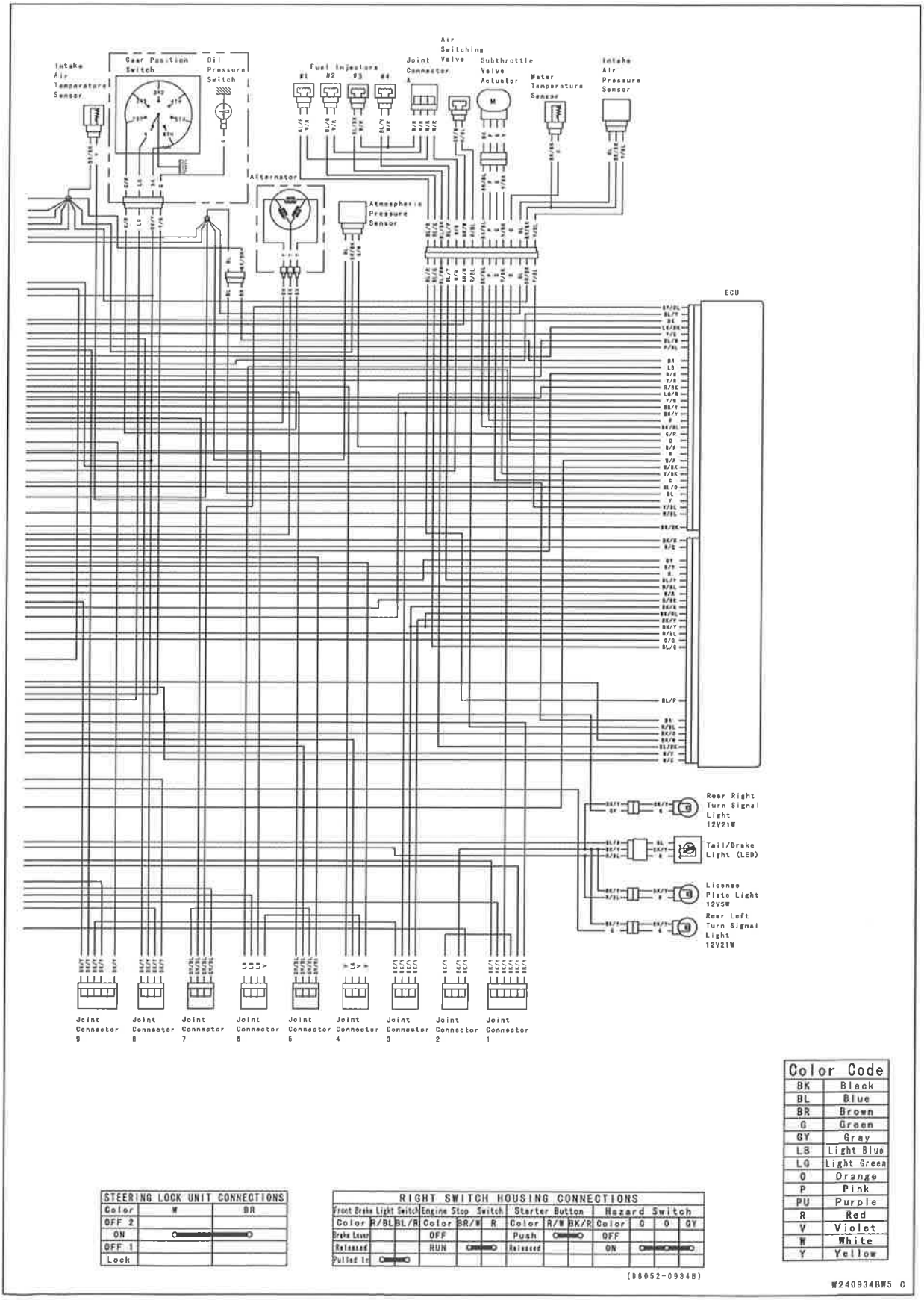
Wiring Diagram



Wiring Diagram



Wiring Diagram



STEERING LOCK UNIT CONNECTIONS		
Color	W	BR
OFF 2		
ON	○	○
OFF 1		
Lock		

RIGHT SWITCH HOUSING CONNECTIONS													
Front Brake Light Switch				Engine Stop Switch			Starter Button			Hazard Switch			
Color	R/BL		BL/R	Color	BR/W		R	Color	R/W	BK/R	Color	G	O	GY
Brake Lever				OFF				Push	○	○	OFF			
Released				RUN	○		○	Released			ON	○	○	○
Pulled In	○		○											

(99052-0934B)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

W240934BW5 C

Specifications

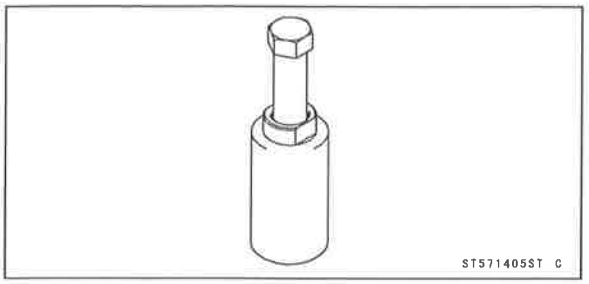
Item	Standard
Battery	
Type	Sealed Battery
Model Name	FTZ14-BS
Capacity	12 V 14 Ah (10 HR)
Voltage	12.6 V or more
Gross Weight	5.0 kg (11 lb)
Electrolyte Volume	0.72 L (44 cu in)
Charging System	
Type	Three-phase AC
Alternator Output Voltage	AC 56 V or more @4 000 r/min (rpm)
Stator Coil Resistance	0.05 ~ 0.5 Ω @20°C (68°F)
Charging Voltage (Regulator/Rectifier Output Voltage)	DC 14.5 ~ 14.9 V @25°C (77°F)
Ignition System	
Crankshaft Sensor Resistance	376 ~ 564 Ω @20°C (68°F)
Crankshaft Sensor Peak Voltage	2.4 V or more
Camshaft Position Sensor Resistance	344 ~ 516 Ω @20°C (68°F)
Camshaft Position Sensor Peak Voltage	2.8 V or more
Spark Plug:	
Type	NGK CR9EIA-9
Gap	0.8 ~ 0.9 mm (0.031 ~ 0.035 in.)
Stick Coil:	
Primary Winding Resistance	1.19 ~ 1.61 Ω @20°C (68°F)
Secondary Winding Resistance	8.5 ~ 11.5 kΩ @20°C (68°F)
Primary Peak Voltage	72 V or more
Electric Starter System	
Starter Motor:	
Brush Length	10 mm (0.39 in.) [Service Limit: 5 mm (0.20 in.)]
Commutator Diameter	28 mm (1.10 in.) [Service Limit: 27 mm (1.06 in.)]
Air Switching Valve	
Resistance	20 ~ 24 Ω @20°C (68°F)
Oil Control Solenoid Valve	
Resistance	6.9 ~ 7.9 Ω @20°C (68°F)
Storage Case Solenoid	
Resistance	27.9 ~ 34.1 Ω @20°C (68°F)
Grip Warmer	
Resistance:	
Right Grip Warmer	About 1.13 ~ 1.39 Ω
Left Grip Warmer	About 1.65 ~ 2.01 Ω
Meter, Gauge, Indicator Unit	
Can Communication Line Resistance	123 ~ 125 Ω @Meter Unit
Speed Sensor Supply Voltage	About 12 V

Specifications

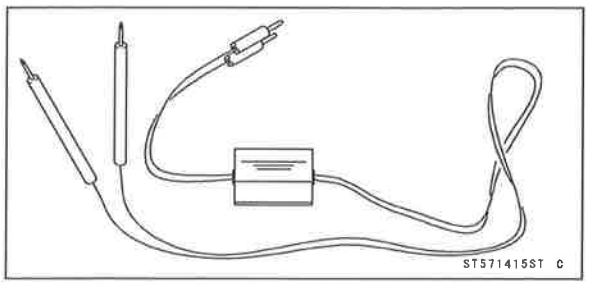
Item	Standard
Switches and Sensors	
Rear Brake Light Switch Timing	ON after about 10 mm (0.39 in.) of pedal travel
Engine Oil Pressure Switch Connections	When engine is stopped: ON When engine is running: OFF
Water Temperature Sensor Resistance	in the text
Fuel Level Sensor Resistance:	
Full Level Position	9 ~ 11 Ω
Empty Level Position	213 ~ 219 Ω
Gear Position Switch Resistance	in the text
Outside Temperature Sensor Resistance	5.4 ~ 6.6 kΩ @0°C (32°F) 0.29 ~ 0.39 kΩ @80°C (176°F)

Special Tools and Sealants

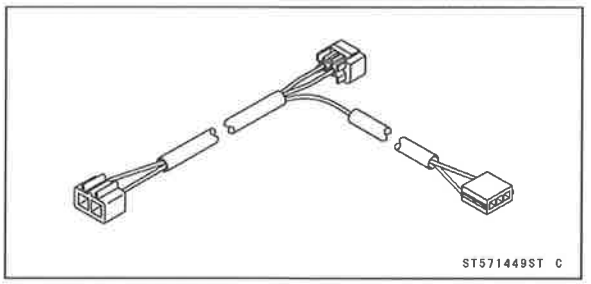
Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:
57001-1405



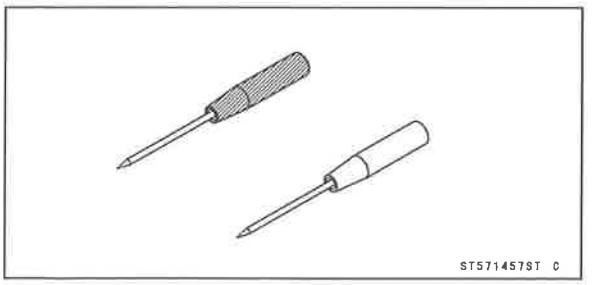
Peak Voltage Adapter:
57001-1415



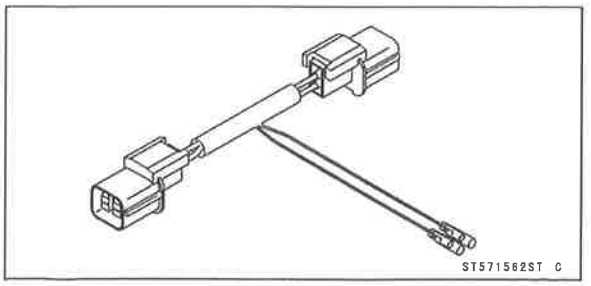
Lead Wire - Peak Voltage Adapter:
57001-1449



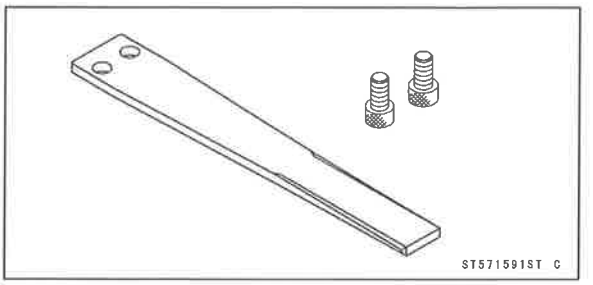
Needle Adapter Set:
57001-1457



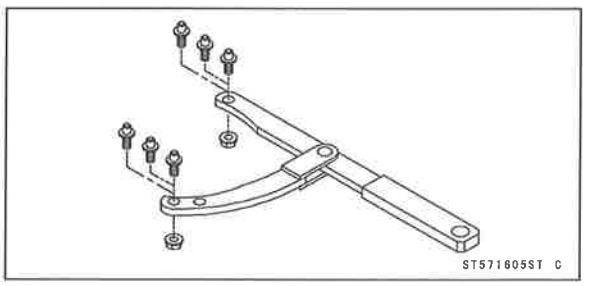
Harness Adapter:
57001-1562



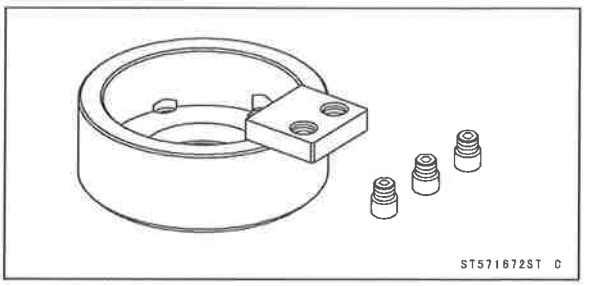
Grip:
57001-1591



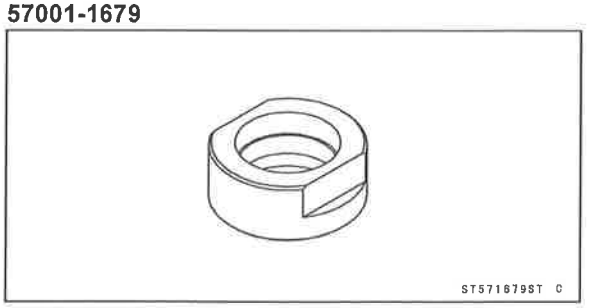
Flywheel & Pulley Holder:
57001-1605



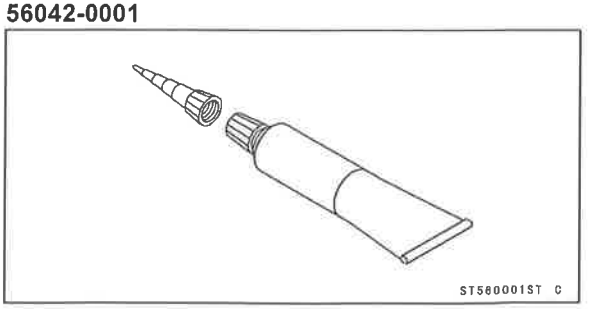
Rotor Holder:
57001-1672



Stopper:
57001-1679

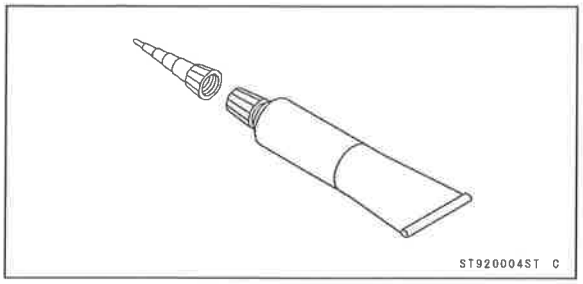


Adhesive, TB1530C:
56042-0001



Special Tools and Sealants

Liquid Gasket, TB1211F:
92104-0004



Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery cable connections. This will burn out the diodes on the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).

Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.

★If any wiring is poor, replace the damaged wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

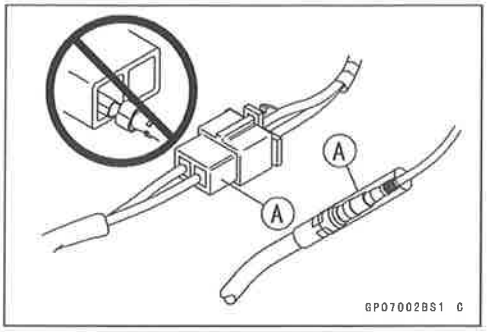
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

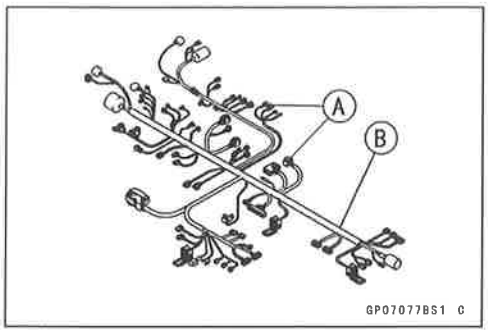
- Check the wiring for continuity.

○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect a tester between the ends of the leads.

★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the wiring harness [B] if necessary.

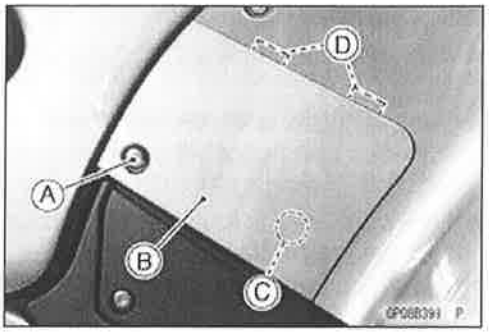




Battery

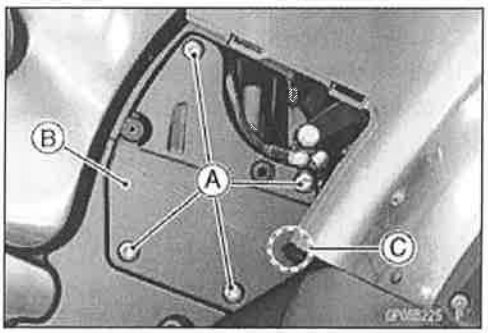
Battery Removal

- Turn the key knob to "OFF."
- Remove:
  Bolt [A] and Washer
- Pull the right cover [B] outward to clear the projection [C].
- Clear the tabs [D] of the right cover from the rear middle fairing.



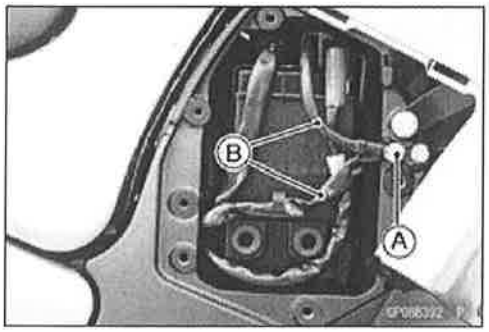
- Remove:
  Battery Compartment Cover Bolts [A]
  Battery Compartment Cover [B]

○Clear the front part [C] of the cover from the rear middle fairing.

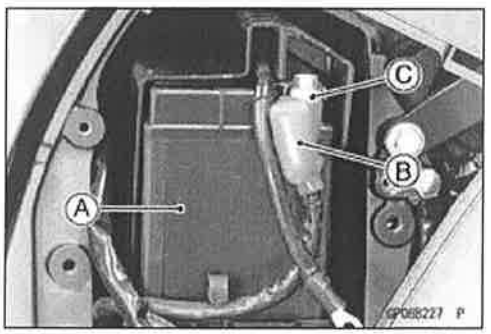


- Remove:
  Frame Ground Bolt [A]
  Negative (–) Cables [B]

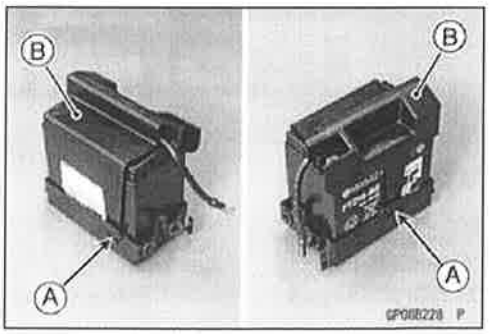
NOTICE
Be sure to disconnect the negative (–) cables first.



- Slightly pull out the battery [A] with battery tray.
- Slide the red cap [B] outward.
- Remove:
  Positive (+) Cable Terminal [C]
  Battery with Battery Tray

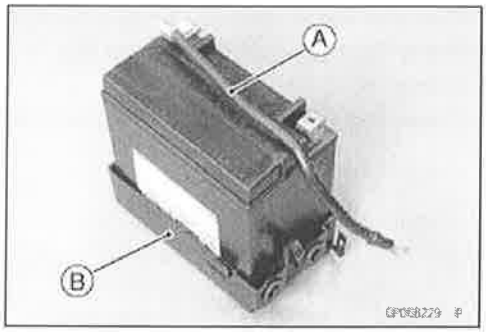


- Unhook the stoppers [A] and remove the battery cover [B].



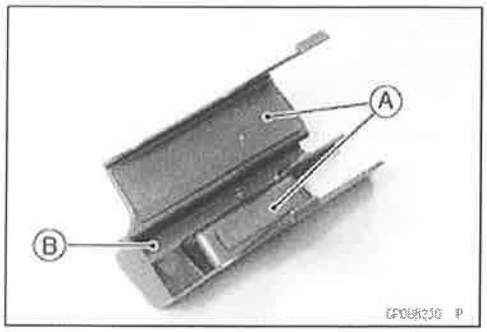
Battery

- Disconnect the negative (–) cable [A].
- Remove the battery [B] from the battery tray.

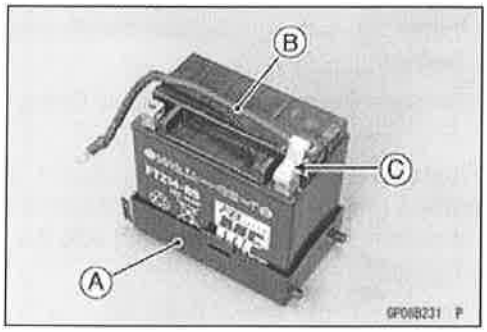


Battery Installation

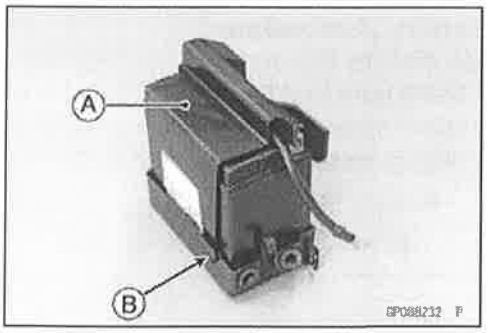
- Check that the dampers [A] are is properly on the battery cover [B].



- Place the battery in the battery tray [A] as shown in the figure.
- Connect the negative (–) cable [B] to the battery.
- Put a light coat of grease on the (–) terminal [C] to prevent corrosion.

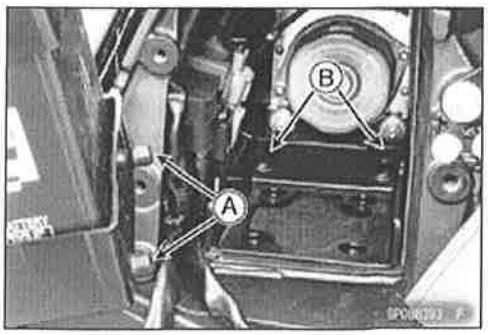


- Put the battery cover [A] on the battery and fit the stoppers [B] into the tray.



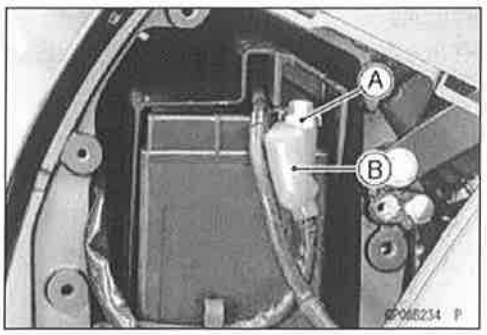
- Insert the battery with the battery tray into the battery compartment.

○Insert the projections [A] on the battery tray into the holes [B] of the battery compartment.



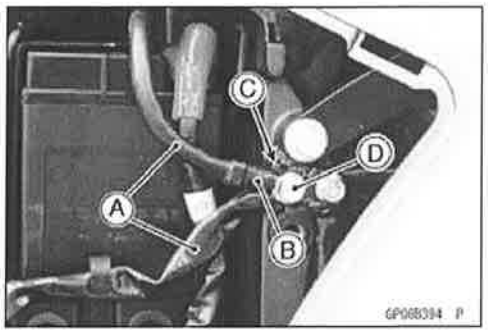
Battery

- Connect the positive (+) cable terminal [A] to the battery.
- Put a light coat of grease on the (+) terminal to prevent corrosion.
- Cover the (+) terminal with its red cap [B].



- Install the negative (–) cables [A] to the frame so that the battery cable terminal [B] touches the stopper [C].
- Tighten:

Torque - Frame Ground Bolt (L = 16 mm) [D]: 7.0 N·m (0.71 kgf·m, 62 in·lb)



- Install the battery compartment cover.
- Tighten:

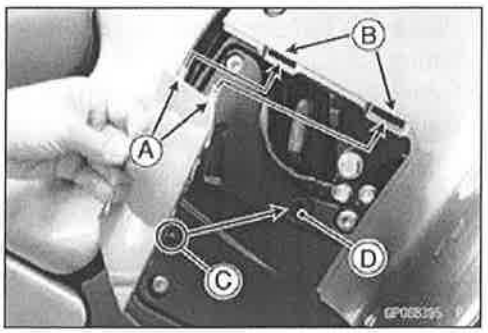
Torque - Battery Compartment Cover Bolts: 2.0 N·m (0.20 kgf·m, 18 in·lb)

- Install the right cover.

○Insert the tabs [A] on the right cover into the slots [B] and then insert the projection [C] into the grommet [D].

- Tighten:

Torque - Right Cover Bolt: 4.0 N·m (0.41 kgf·m, 35 in·lb)



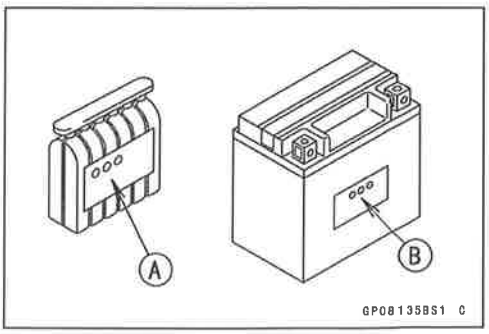
Battery Activation

Electrolyte Filling

- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name

ZG1400E: FTZ14-BS



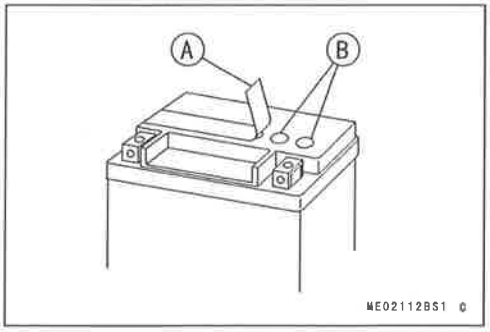
NOTICE

Each battery comes with its own specific electrolyte container; using the wrong container may overfill the battery with incorrect electrolyte, which can shorten battery life and deteriorate battery performance. Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type.

Battery

NOTICE

Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.



⚠ DANGER

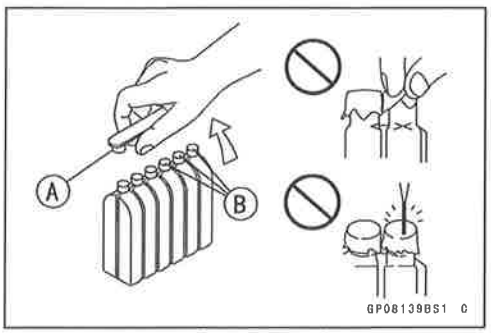
Sulfuric acid in battery electrolyte can cause severe burns. To prevent burns, wear protective clothing and safety glasses when handling electrolyte. If the electrolyte comes in contact with your skin or eyes, wash the area with liberal amounts of water and seek medical attention for more severe burns.

- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

NOTE

○*The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.*

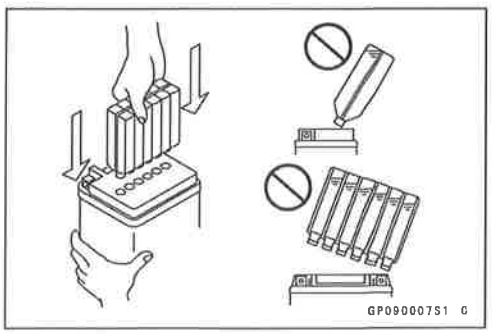
- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.



NOTE

○*Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.*

- Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.



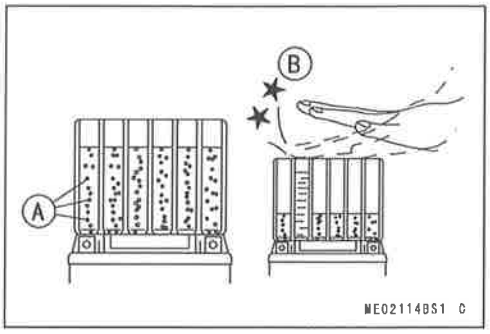
NOTE

○*Do not tilt the electrolyte container.*

Battery

- Check the electrolyte flow.

★If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.



NOTE

○*Be careful not to have the battery fall down.*

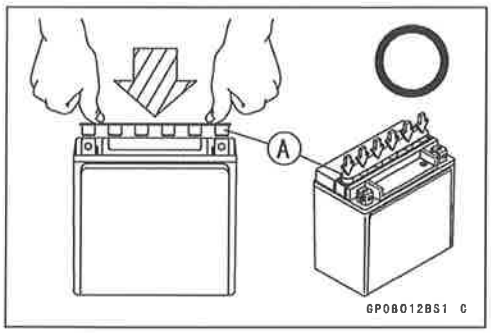
- Keep the container in place. Do not remove the container from the battery, the battery requires all the electrolyte from the container for proper operation.

NOTICE

Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the container until it is completely empty.

- After filling, let the battery sit for 20 ~ 60 minutes with the electrolyte container kept in place, which is required for the electrolyte to fully permeate into the plates.
- Make sure that the container cells have emptied completely, and remove the container from the battery.

- Place the strip of caps [A] loosely over the filler ports, press down firmly with both hands to seat the strip of caps into the battery (don't pound or hammer). When properly installed, the strip of caps will be level with the top of the battery.

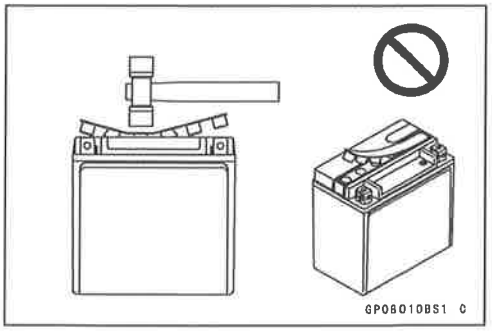


NOTICE

Once the strip of caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.

NOTE

○*Charging the battery immediately after filling can shorten service life.*



Battery

Initial Charge

- Newly activated sealed batteries require an initial charge.

Standard Charge: 1.4 A × 5 ~ 10 hours

★If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

Kawasaki-recommended chargers:
Battery Mate 150-9
OptiMate PRO 4-S/PRO S/PRO2
Yuasa MB-2040/2060
Christie C10122S

★If the above chargers are not available, use equivalent one.

- Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. (Voltage immediately after charging becomes temporarily high. For accurate measuring, let the battery sit for given time.)

NOTE

○*Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. If voltage is not at least 12.6 V, repeat charging cycle.*

○*To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds.*
Re-check voltage and if less than 12.6 V repeat the charging cycle and load test. If still below 12.6 V the battery is defective.

Precautions

1) No need of topping-up

No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.

2) Refreshing charge

If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge).

When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

NOTICE

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.
If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

3) When you do not use the motorcycle for months:

Give a refresh charge before you store the motorcycle and store it with the negative cable removed. Give a refresh charge **once a month** during storage.

4) Battery life:

If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it (Provided, however, the vehicle's starting system has no problem).

Battery

⚠ DANGER

Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water and seek medical attention for more severe burns.

Interchange

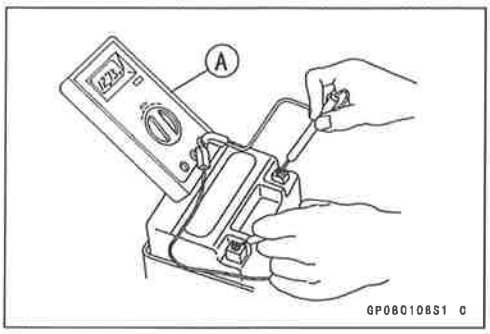
A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

Charging Condition Inspection

○Battery charging condition can be checked by measuring battery terminal voltage with a digital voltmeter [A].

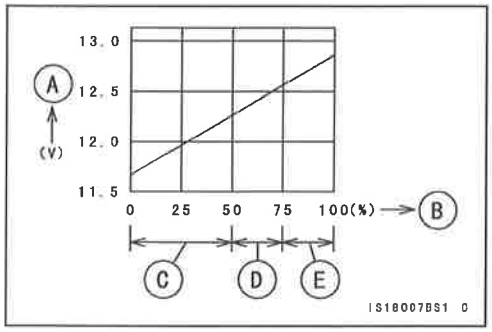
- Remove the battery (see Battery Removal).
- Measure the battery terminal voltage.



NOTE

○*Measure with a digital voltmeter which can be read one decimal place voltage.*

★If the reading is 12.6 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.



Battery Terminal Voltage
Standard: 12.6 V or more

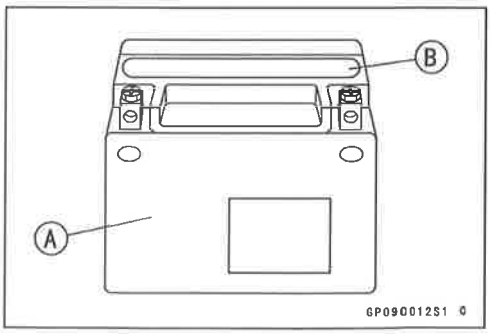
Terminal Voltage (V) [A]
Battery Charge Rate (%) [B]
Refresh charge is required [C]
Note [D]
Good [E]

Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.



Battery

Terminal Voltage: 11.5 ~ less than 12.6 V
Standard Charge 1.4 A × 5 ~ 10 h (see following chart)
Quick Charge 7 A × 1 h

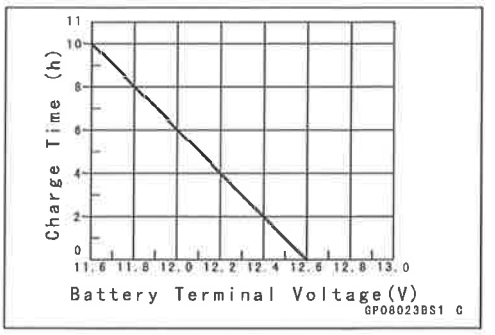
NOTICE
If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.

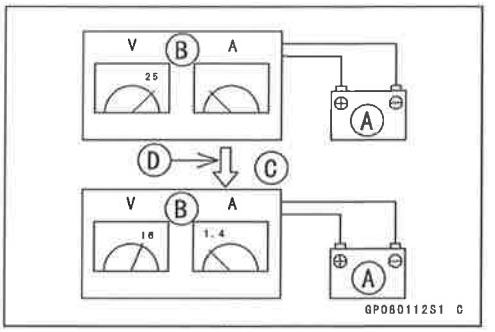
Terminal Voltage: less than 11.5 V
Charging Method: 1.4 A × 20 h

NOTE

○*Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.*

Battery [A]
Battery Charger [B]
Standard Value [C]
Current starts to flow [D]





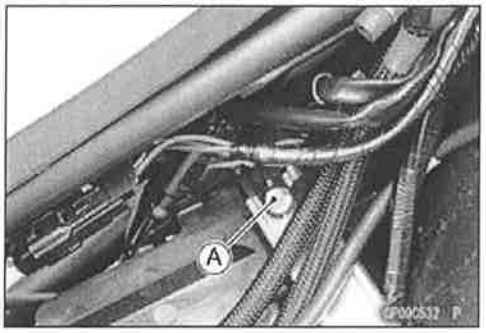
● Determine the battery condition after refresh charge.
○Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

Criteria	Judgement
12.6 V or higher	Good
12.0 ~ lower than 12.6 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

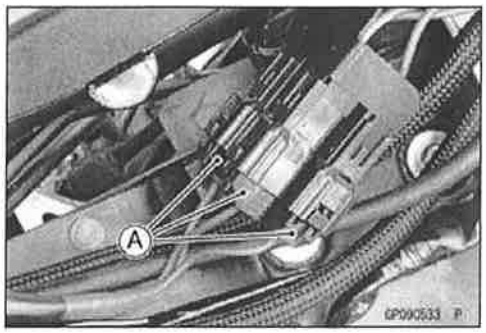
Charging System

Alternator Cover Removal

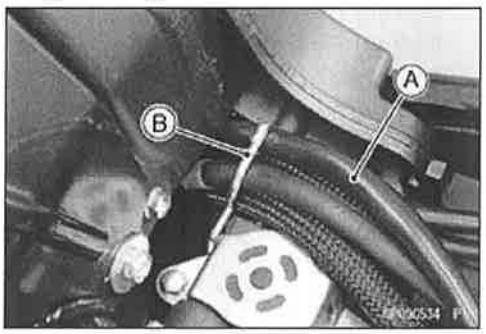
- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Bolt [A]



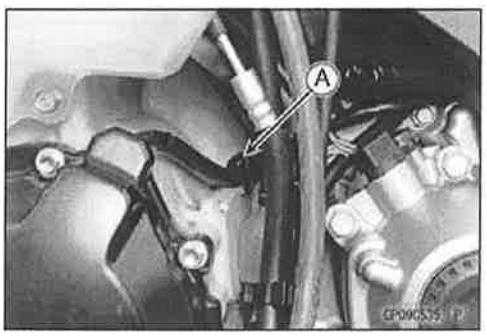
- Disconnect the alternator lead connectors [A].



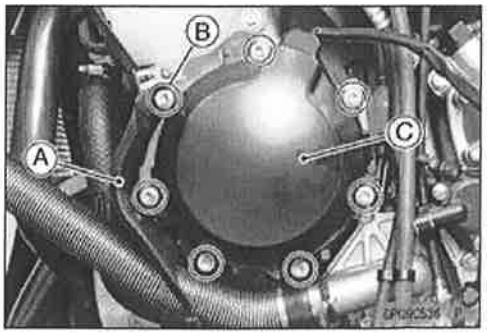
- Clear the alternator lead [A] from the bracket [B].



- Open the clamp [A].

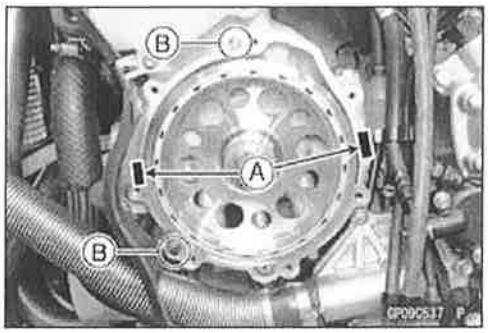


- Move the left inner rubber cover [A] forward.
- Pull out the alternator lead from between the engine and frame.
- Remove:
  Alternator Cover Bolts [B]
  Alternator Cover [C]



Charging System

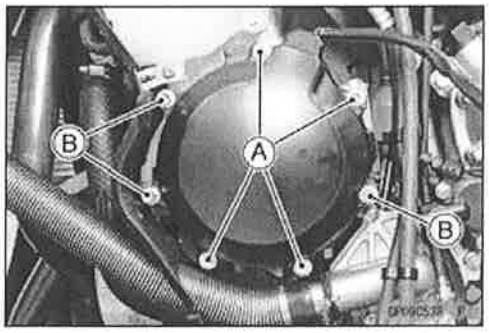
Alternator Cover Installation



- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the alternator lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Check that dowel pins [B] are in place on the crankcase.
- Install a new gasket and the alternator cover.



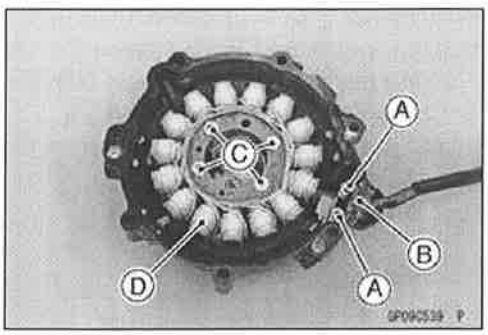
- Tighten:

Torque - Alternator Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

30 mm (1.18 in.) [A]
45 mm (1.77 in.) [B]

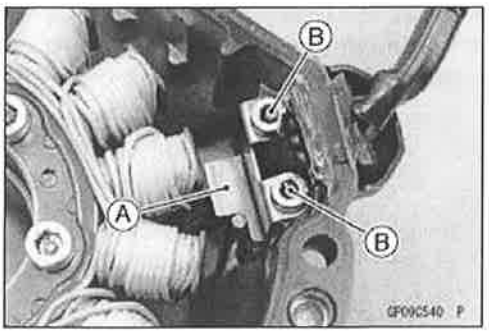
- Run the alternator lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Stator Coil Removal



- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Alternator Lead Holding Plate Bolts [A] and Plate
  Alternator Lead Grommet [B]
  Stator Coil Bolts [C]
- Remove the stator coil [D] from the alternator cover.

Stator Coil Installation



- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Tighten the stator coil bolts to the specified torque.

Torque - Stator Coil Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

- Apply liquid gasket to the circumference of the alternator lead grommet, and fit the grommet into the notch of the cover securely.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Secure the alternator lead with a holding plate [A], and apply a non-permanent locking agent to the thread of the plate bolts [B] and tighten them.

Torque - Alternator Lead Holding Plate Bolts: 7.8 N·m (0.80 kgf·m, 69 in·lb)

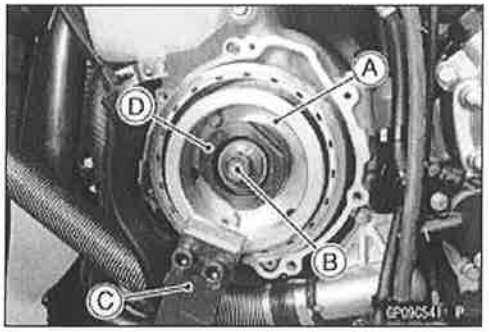
- Install the alternator cover (see Alternator Cover Installation).

Charging System

Alternator Rotor Removal

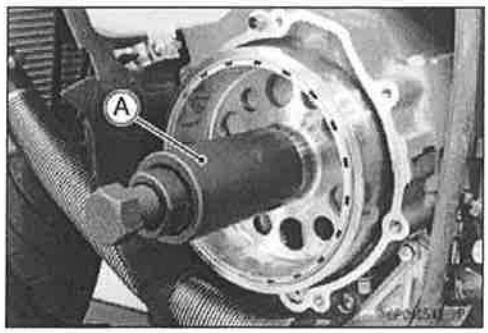
- Remove the alternator cover (see Alternator Cover Removal).
- Clean off the oil from the outer circumference of the rotor.
- Hold the alternator rotor steady with the rotor holder [A], and remove the rotor bolt [B] and washer.

Special Tools - Grip [C]: 57001-1591
Rotor Holder: 57001-1672
Stopper [D]: 57001-1679



- Using the flywheel puller [A], remove the alternator rotor from the crankshaft.

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405

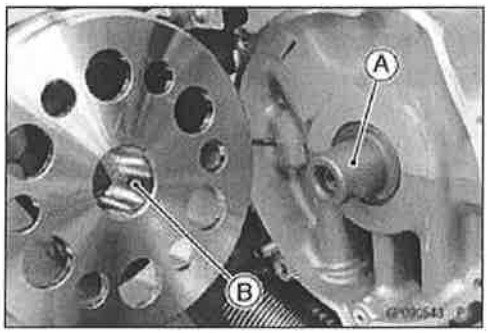


NOTICE

Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

Alternator Rotor Installation

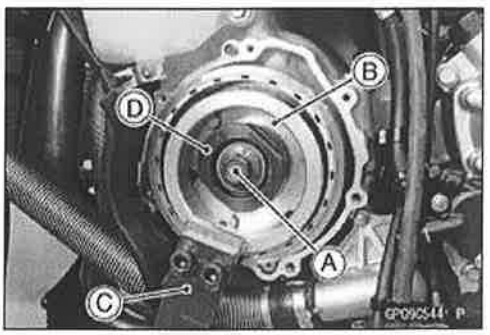
- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  Crankshaft Tapered Portion [A]
  Alternator Rotor Tapered Portion [B]
- Install the alternator rotor.



- Install the washer.
- Tighten the alternator rotor bolt [A] while holding the alternator rotor steadily with the holder [B].

Special Tools - Grip [C]: 57001-1591
Rotor Holder: 57001-1672
Stopper [D]: 57001-1679

Torque - Alternator Rotor Bolt: 70 N·m (7.0 kgf·m, 52 ft·lb)

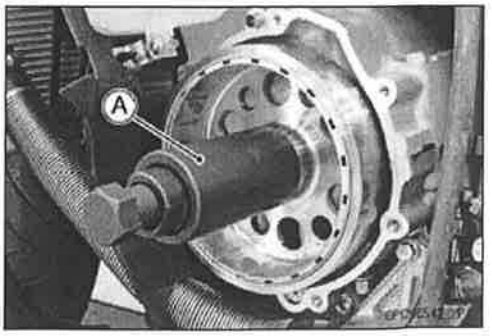


- Remove the rotor bolt and washer.
- Check the tightening torque with flywheel puller [A].

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405

★If the rotor is not pulled out with 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, it is installed correctly.

★If the rotor is pulled out with under 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.



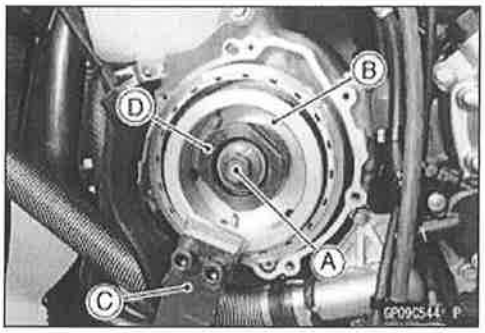
Charging System

- Install the rotor bolt and washer.
- Tighten the alternator rotor bolt [A] while holding the alternator rotor steadily with the holder [B].

Special Tools - Grip [C]: 57001-1591
Rotor Holder: 57001-1672
Stopper [D]: 57001-1679

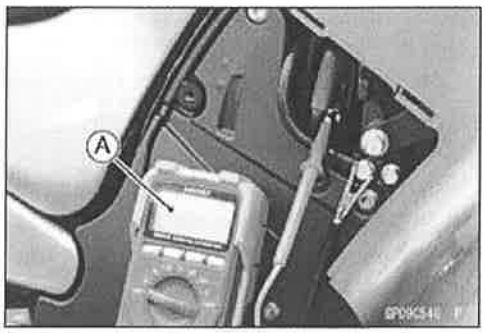
Torque - Alternator Rotor Bolt: 155 N·m (15.8 kgf·m, 114 ft·lb)

- Install the alternator cover (see Alternator Cover Installation).



Charging Voltage Inspection

- Check the battery condition (see Charging Condition Inspection).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the right cover (see Battery Removal).
- Check that the key knob is turned to "OFF," and connect a tester [A] to the battery (+) terminal and ground.
- Start the engine, and note the voltage readings at various engine speeds (except idling engine speed) with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector on the headlight unit.). The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.



Charging Voltage

Connections		Reading
Tester (+) to	Tester (–) to	
Battery (+)	Ground	DC 14.4 ~ 14.9 V

- Turn off the key knob to stop the engine, and disconnect the tester.

★If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.

★If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the rotor, by leaving it near an electromagnetic field, or just by aging, will result in low output.

Charging System

- To check the alternator output voltage, do the following procedures.

○Turn the key knob to "OFF."
○Disconnect the alternator lead connector [A] from the regulator/rectifier.
○Connect a tester [B] as shown in the table 1.
○Start the engine.
○Run it at the rpm given in the table 1.
○Note the voltage readings (total 3 measurements).

Table 1 Alternator Output Voltage @4 000 r/min (rpm)

Connections		Reading
Tester (+) to	Tester (–) to	
One Black Lead	Another Black Lead	AC 56 V or more

★If the output voltage shows the value in the table, the alternator operates properly.
★If the output voltage shows a much higher than the value in the table, the regulator/rectifier is damaged. A much lower reading than that given in the table indicates that the alternator is defective.

- Check the stator coil resistance as follows.

○Stop the engine.
○Connect the tester as shown in the table 2.
○Note the resistance readings (total 3 measurement).

Table 2: Stator Coil Resistance @20°C (68°F)

Connections		Reading
Tester (+) to	Tester (–) to	
One Black Lead	Another Black Lead	0.05 ~ 0.5 Ω

★If there is more resistance than shown in the table, or no tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.

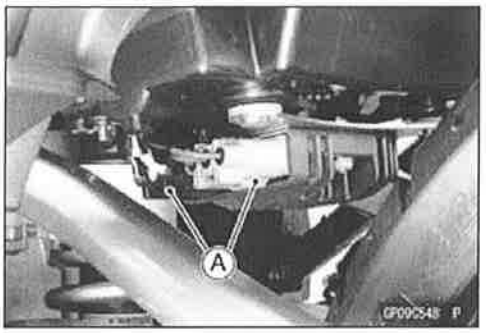
- Using the highest resistance range of the tester, measure the resistance between each of the black leads and chassis ground.

★Any the tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
★If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

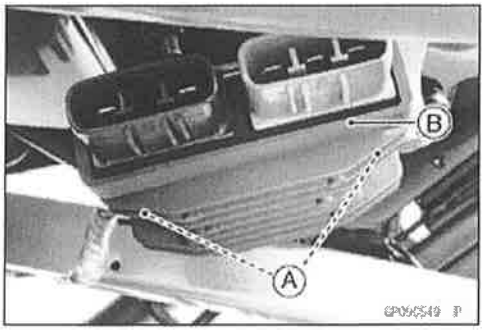
Charging System

Regulator/Rectifier Removal

- Remove:
  Connectors [A]



- Remove:
  Regulator/Rectifier Bolts [A]
  Regulator/Rectifier [B]



Regulator/Rectifier Installation

- Installation is the reverse of removal.
- Tighten:

Torque - Regulator/Rectifier Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Regulator/Rectifier Inspection

- Refer to the Charging System Troubleshooting for the Regulator/Rectifier Inspection

Charging System Troubleshooting

- Before inspection, remove all accessories that consume electrical power.

NOTE

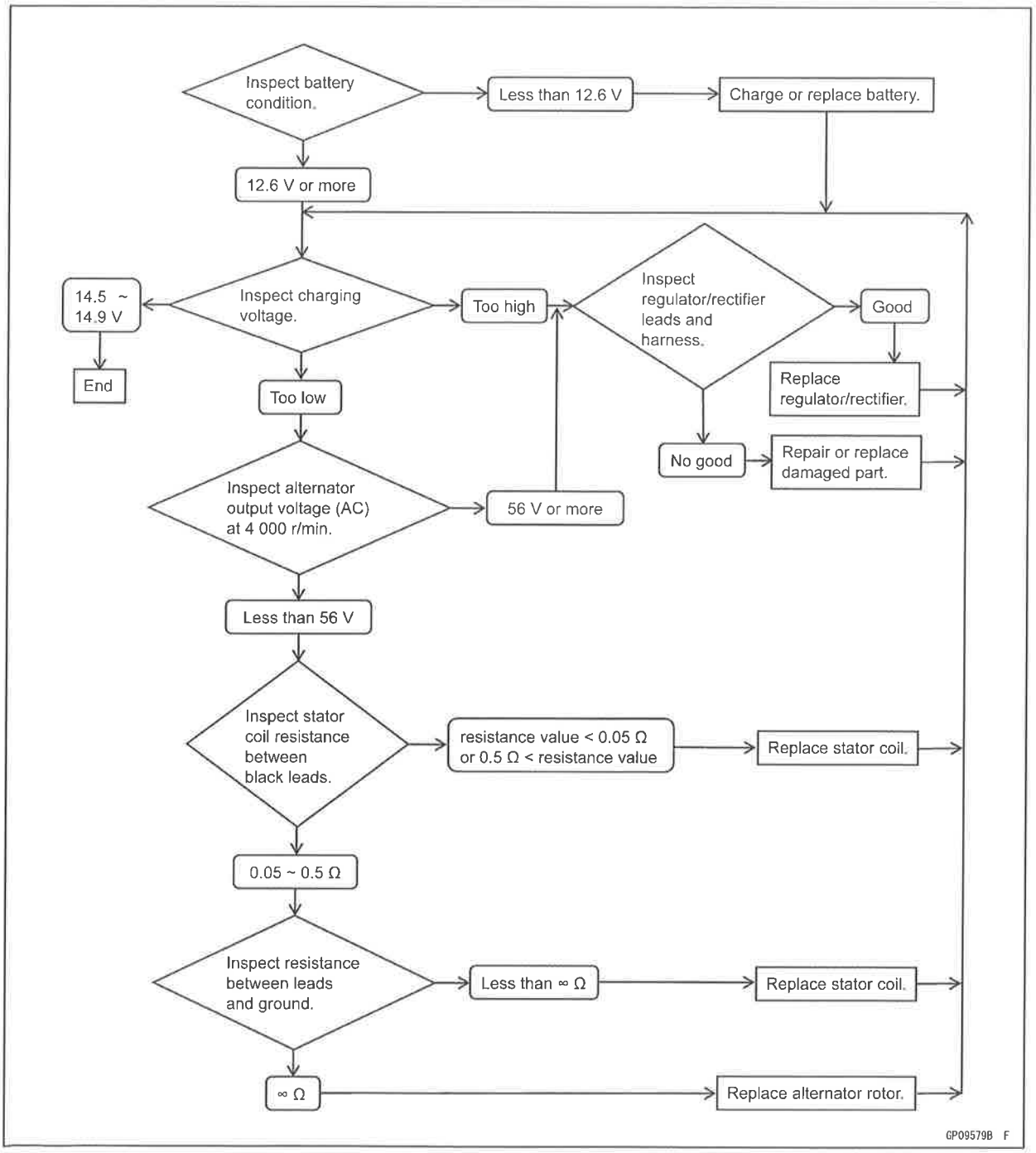
○*Even when the charging system is working properly, the battery may discharge if the motorcycle is equipped with too many accessories.*

- Pay attention to riding conditions and the customer's riding habits which could affect the charging system such as:

Frequent use at low engine speed
Frequent and unnecessary brake pedal dragging
→ Battery Discharged

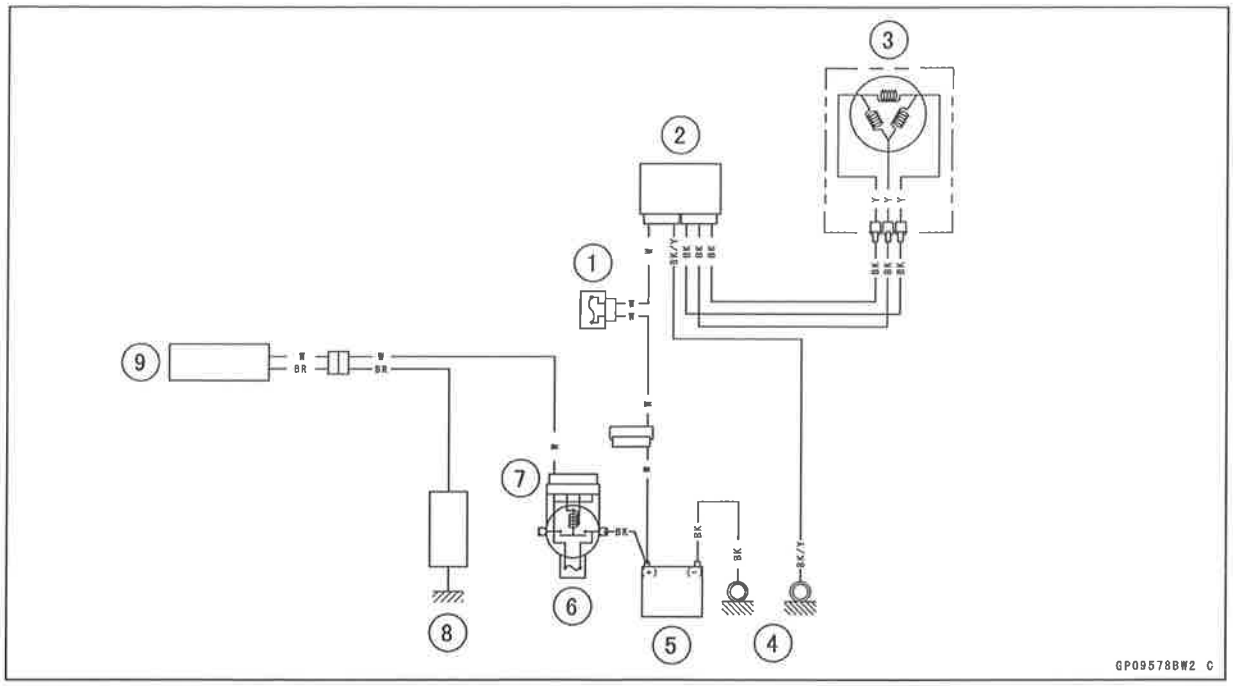
- Recharge the battery if it is discharged.

Charging System



Charging System

Charging System Circuit



1. Regulator Fuse 50 A
2. Regulator/Rectifier
3. Alternator
4. Frame Ground
5. Battery 12 V 14 Ah
6. Main Fuse 30 A
7. Starter Relay
8. Load
9. Steering Lock Unit

Ignition System

⚠ WARNING

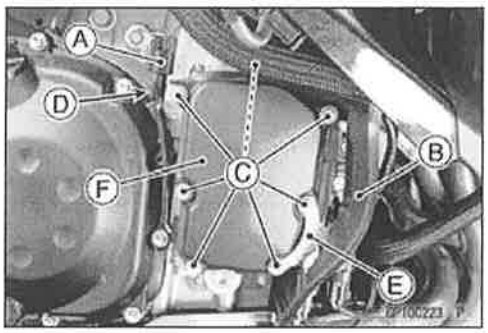
The ignition system produces extremely high voltage. Do not touch the spark plug, stick coil or stick coil lead while the engine is running, or you could receive a severe electrical shock.

NOTICE

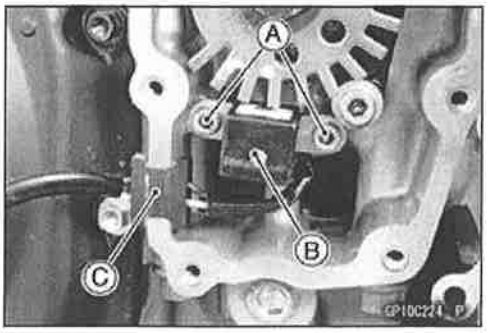
Do not disconnect the battery cables or any other electrical connections when the key knob in the "ON" position, or while the engine is running. This is to prevent ECU damage.
Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the ECU.

Crankshaft Sensor Removal

- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the crankshaft sensor lead connector [A].
- Move the right inner rubber cover [B] forward.
- Remove:
  Crankshaft Sensor Cover Bolts [C]
  Clamp [D]
  Bracket [E]
  Crankshaft Sensor Cover [F]



- Remove:
  Crankshaft Sensor Bolts [A]
  Crankshaft Sensor [B]
  Grommet [C]



Crankshaft Sensor Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply a non-permanent locking agent to the threads of the crankshaft sensor bolts [A], and tighten them.

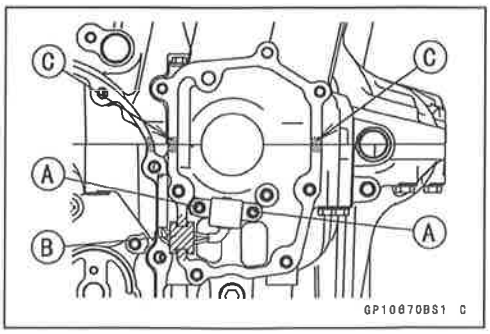
  Torque - Crankshaft Sensor Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

- Apply liquid gasket to the circumference of the crankshaft sensor lead grommet [B], and fit the grommet into the notch of the crankcase securely.

  Sealant - Liquid Gasket, TB1211F: 92104-0004

- Apply liquid gasket to the mating surface [C] of crankcase halves.

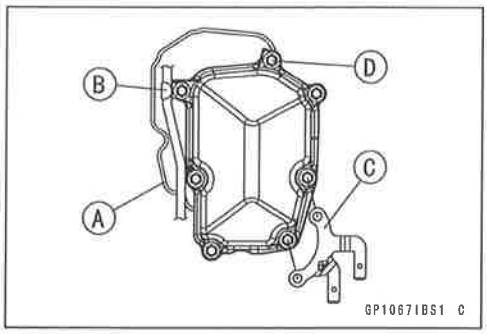
  Sealant - Liquid Gasket, TB1211F: 92104-0004



Ignition System

- Replace the O-ring [A] with a new one.
- Install:
  Crankshaft Sensor Cover
  Clamp [B]
  Bracket [C]
- Apply a non-permanent locking agent to only one crankshaft sensor cover bolt [D].
- Tighten the crankshaft sensor cover bolts.

Torque - Crankshaft Sensor Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



- Run the crankshaft sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Crankshaft Sensor Inspection

- Disconnect the crankshaft sensor lead connector (see Crankshaft Sensor Removal).
- Connect a tester [A] to the crankshaft sensor lead connector [B].

Crankshaft Sensor Resistance
Connections:
Tester (+) → Y Lead
Tester (–) → BK Lead
Standard: 376 ~ 564 Ω @20°C (68°F)

★If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.

- Using the highest resistance range of the tester, measure the resistance between the crankshaft sensor leads and chassis ground.

★Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor.

Crankshaft Sensor Peak Voltage Inspection

NOTE

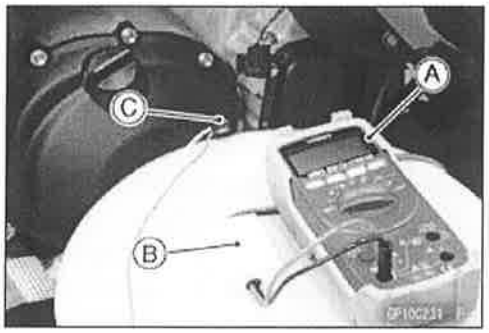
○*Be sure the battery is fully charged.*
○*Using the peak voltage adapter is a more reliable way to determine the condition of the crankshaft sensor than crankshaft sensor internal resistance measurements.*

- Disconnect the crankshaft sensor lead connector (see Crankshaft Sensor Removal).

Ignition System

- Set a tester [A] and connect the peak voltage adapter [B].

Special Tool - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B



Connections:

Crankshaft Sensor Connector [C]		Adapter		Tester
BK Lead	←	BK Lead	→	(–)
Y Lead	←	R Lead	→	(+)

- Turn the engine stop switch to run position.
- Turn the key knob to "ON."
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurement 5 or more times.

Crankshaft Sensor Peak Voltage
Standard: 2.4 V or more

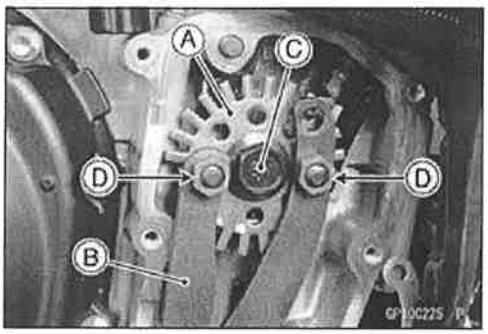
★If the tester reading is not specified one, check the crankshaft sensor (see Crankshaft Sensor Inspection).

Timing Rotor Removal

- Remove:
  Crankshaft Sensor (see Crankshaft Sensor Removal)
- Remove the timing rotor [A].

○Holding the timing rotor with the flywheel & pulley holder [B] and remove the rotor bolt [C].
○Use the nuts [D] without the flange.

Special Tool - Flywheel & Pulley Holder: 57001-1605



Timing Rotor Installation

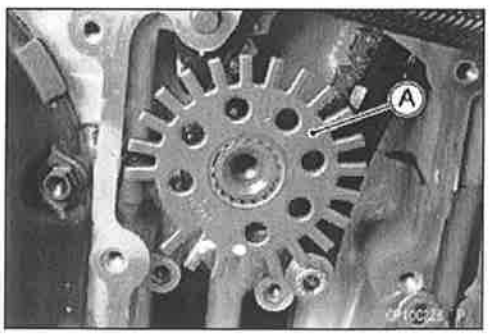
- Fit the rotor [A] to the crankshaft.
- Holding the timing rotor with the flywheel & pulley holder and tighten the rotor bolt.

Special Tool - Flywheel & Pulley Holder: 57001-1605

- Tighten:

Torque - Timing Rotor Bolt: 39 N·m (4.0 kgf·m, 29 ft·lb)

- Install the removed parts (see appropriate chapters).



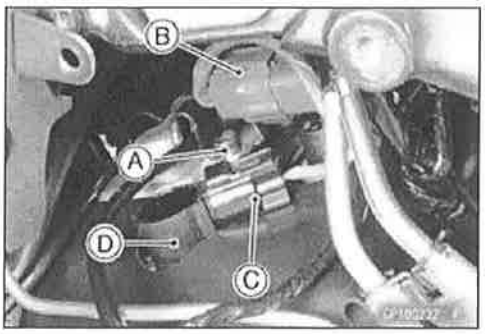
Stick Coil Removal

NOTICE
Never drop the stick coils, especially on a hard surface. **Such a shock to the stick coils can damage it.**

- Remove:
  Fairing Stays (see Fairing Stay Removal in the Frame chapter)
  Subframes (see Subframe Removal in the Frame chapter)

Ignition System

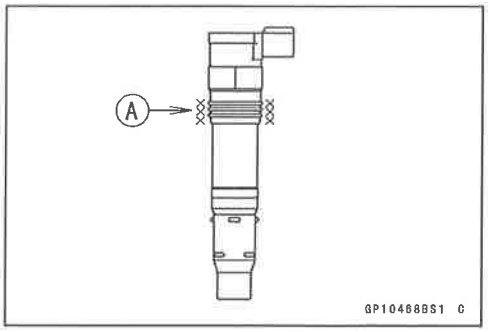
- Remove the air suction valve cover bolt [A] to free the stick coil lead connector [B].
- Disconnect the stick coil connector(s) [C].
- Remove the stick coil(s) [D].



NOTICE
Do not pry the connector part of the coil while removing the coil.

Stick Coil Installation

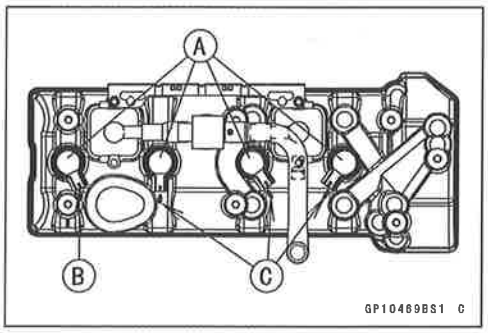
- Apply grease [A] to the stick coils as shown.



- Insert the stick coils [A] as shown being careful of the coil heads directions.

○Install #1 stick coil [B] as shown in the figure.

○Align the lines [C] of the cylinder head cover with coil heads of #2 ~ #4 coils.



NOTICE
Do not tap the coil head while installing the coil.

- After installation, be sure the stick coils are installed securely by pulling up them lightly.
- Connect the stick coil connectors.
- Run the hoses and harness correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Ignition System

Stick Coil Inspection

- Remove the stick coils (see Stick Coil Removal).
- Measure the primary winding resistance [A] as follows.

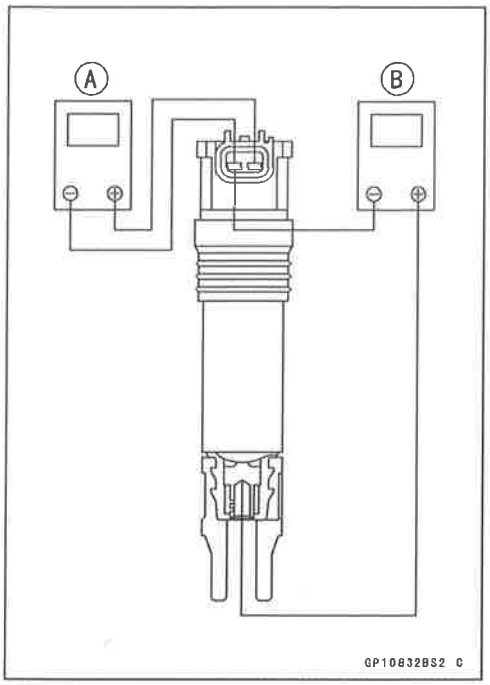
○Connect a tester between the coil terminals.

- Measure the secondary winding resistance [B] as follows.

○Connect the tester between the plug terminal and (–) coil terminal.

Stick Coil Winding Resistance
Primary Windings: 1.19 ~ 1.61 Ω @20°C (68°F)
Secondary Windings: 8.5 ~ 11.5 kΩ @20°C (68°F)

★If the meter does not read as specified, replace the coil.



Stick Coil Primary Peak Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove the stick coils (see Stick Coil Removal).

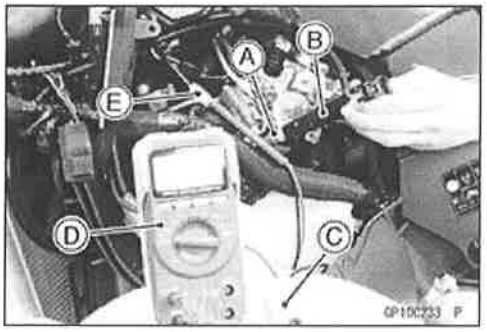
○Do not remove the spark plugs.

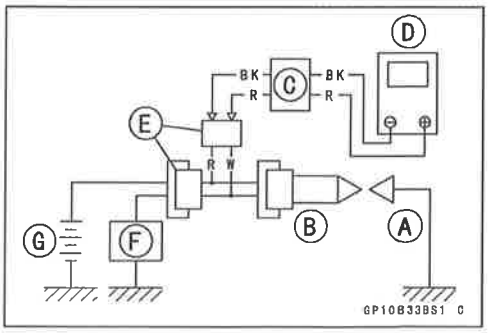
- Measure the primary peak voltage as follows.

○Install the new spark plug [A] into each stick coil [B], and ground them onto the engine.
○Connect the peak voltage adapter [C] to a tester [D].
○Connect the adapter to the lead wire-peak voltage adapter [E] which is connected between the stick coil connector and stick coil.
ECU [F]
Battery [G]

Special Tools - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B
Lead Wire-Peak Voltage Adapter: 57001-1449

Primary Lead Connection
Adapter (R, +) to lead wire-peak voltage adapter (W)
Adapter (BK, –) to lead wire-peak voltage adapter (R)





Ignition System

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Turn the key knob and engine stop switch to "ON."
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission in neutral to measure the primary peak voltage.
- Repeat the measurements 5 times for one stick coil.

Stick Coil Primary Peak Voltage
Standard: 72 V or more

- Repeat the test for the other stick coils.

★If the reading is less than the specified value, check the following.
Stick Coils (see Stick Coil Inspection)
Crankshaft Sensor (see Crankshaft Sensor Inspection)
ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)

Spark Plug Removal

- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter (see Spark Plug Replacement in the Periodic Maintenance chapter).

Spark Plug Installation

- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter (see Spark Plug Replacement in the Periodic Maintenance chapter).

Spark Plug Condition Inspection

- Visually inspect the spark plugs.

★If the spark plug center electrode [A] and/or side electrode [B] are corroded or damaged, or if the insulator [C] is cracked, replace the plug.

★If the spark plug is dirtied or the carbon is accumulated, replace the spark plug.

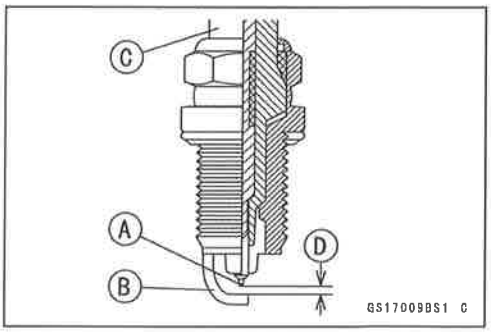
- Measure the gap [D] with a wire-type thickness gauge.

★If the gap is incorrect, replace the spark plug.

Spark Plug Gap: 0.8 ~ 0.9 mm (0.031 ~ 0.035 in.)

- Use the standard spark plug or its equivalent.

Spark Plug: NGK CR9EIA-9



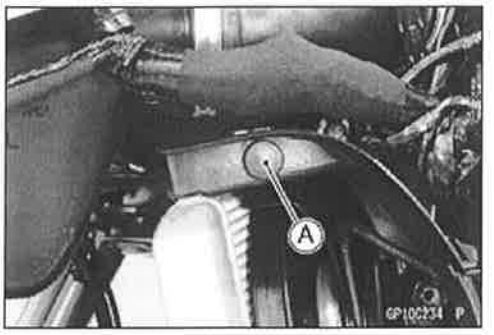
Camshaft Position Sensor Removal

- Remove:
Middle Fairings (see Middle Fairing Removal in the Frame chapter)
Lower Fairings (see Lower Fairing Removal in the Frame chapter)
Left Fairing Stay (see Fairing Stay Removal in the Frame chapter)
Left Subframe (see Subframe Removal in the Frame chapter)

Ignition System

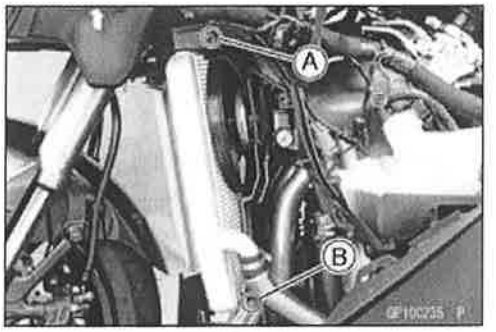
Exhaust Side

- Remove:
  Grommet [A] (Both Sides)

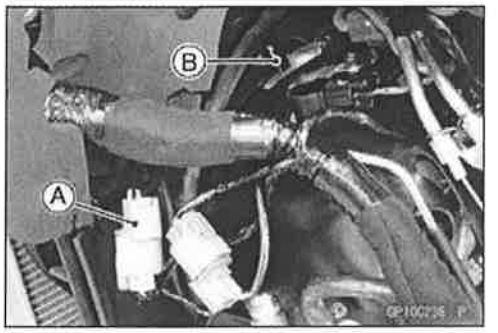


- Remove:
  Upper Radiator Bolt [A] (Both Sides)
  Lower Radiator Bolt [B]
- Lower the radiator.

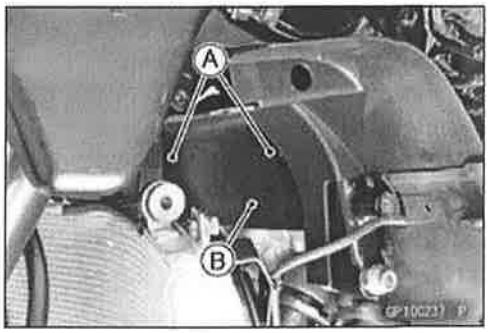
○Take care not to damage the radiator fins.



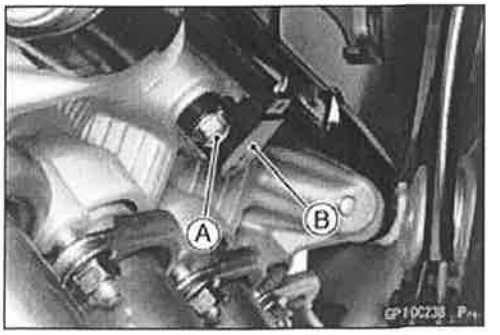
- Disconnect the exhaust camshaft position sensor lead connector [A].
- Free the exhaust camshaft position sensor lead from the clamp [B].



- Remove:
  Quick Rivets [A]
- Lift the cover [B] a little.



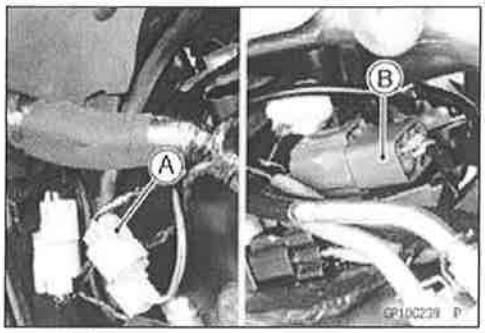
- Remove:
  Camshaft Position Sensor Bolt [A]
  Exhaust Camshaft Position Sensor [B]



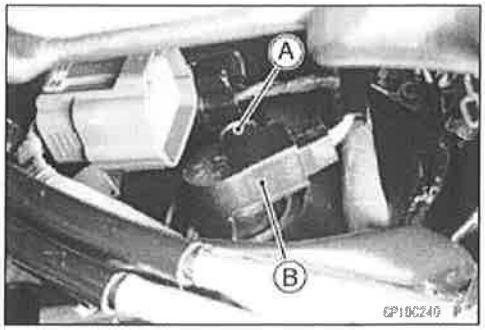
Ignition System

Intake Side

- Disconnect:
  Intake Camshaft Position Sensor Lead Connector [A]
  Stick Coil Lead Connector [B]



- Remove:
  Camshaft Position Sensor Bolt [A]
  Intake Camshaft Position Sensor [B]



Camshaft Position Sensor Installation

- Replace the O-rings of the camshaft position sensors.
- Apply soap and water solution to the new O-rings.
- Tighten:

Torque - Camshaft Position Sensor Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).
- Run the camshaft position sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Camshaft Position Sensor Inspection

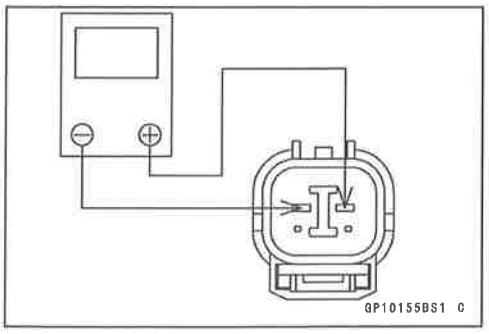
- Disconnect the camshaft position sensor lead connector (see Camshaft Position Sensor Removal).
- Connect a tester to the terminals.

Camshaft Position Sensor Resistance
Standard: 344 ~ 516 Ω @20°C (68°F)

★If there is more resistance than the specified value, the sensor coil has an open lead and must be replaced. Much less than this resistance means the sensor coil is shorted, and must be replaced.

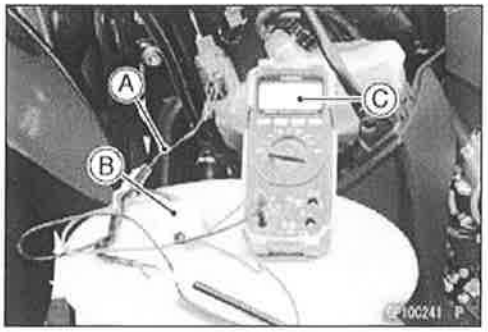
- Using the highest resistance range of the tester, measure the resistance between the camshaft position sensor leads and chassis ground.

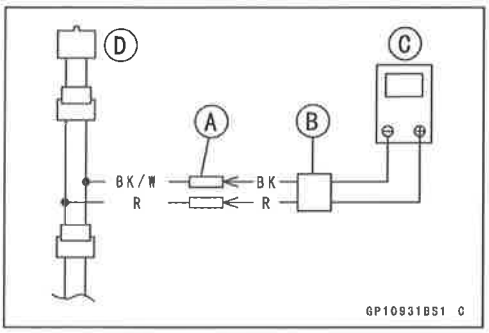
★Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the camshaft position sensor.



Ignition System

Camshaft Position Sensor Peak Voltage Inspection





- Disconnect the camshaft position sensor lead connector (see Camshaft Position Sensor Removal).
- Connect the harness adapter [A] between the camshaft position sensor lead connector and harness connector.
- Connect the peak voltage adapter [B] to a tester [C].
- Connect the adapter to the harness adapter.
  Camshaft Position Sensor [D]

Special Tools - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B
Harness Adapter: 57001-1562

Connections:

Harness Adapter		Peak Voltage Adapter		Tester
BK/W Lead	←	BK Lead	→	(–)
R Lead	←	R Lead	→	(+)

- Turn the key knob and engine stop switch to "ON."
- Pushing the starter button, run the engine with the transmission gear in neutral to measure the camshaft position sensor peak voltage.
- Repeat the measurement 5 or more times.

Camshaft Position Sensor Peak Voltage
Standard: 2.8 V or more

★If the peak voltage is lower than the standard, replace the camshaft position sensor.

Interlock Operation Inspection

- Use the center stand to support the motorcycle upright.
- Turn the engine stop switch on (run position).

1st Check

- Start the engine at the following conditions.

Condition:
Transmission Gear → 1st Position
Clutch Lever → Release
Side Stand → Down or Up

○Turn the key knob to "ON" and push the starter button.
○Then the starter motor should not turn when the starter system circuit is normality.
★If the engine starts, inspect the starter lockout switch, gear position switch, relay box.

Ignition System

2nd Check

- Start the engine at the following conditions.

Condition:

Transmission Gear → 1st Position

Clutch Lever → Pulled in

Side Stand → Up

○Turn the key knob to "ON" and push the starter button.
○Then the starter motor should turn when the starter system circuit is normality.
★If the starter motor does not turn, inspect the starter lockout switch, side stand switch, relay box and starter relay.

3rd Check

- Inspect the engine for its secure stop after the following operations are completed.
- Run the engine at the following conditions.

Condition:

Transmission Gear → 1st Position

Clutch Lever → Release

Side Stand → Up

- Set the side stand on the ground, then the engine will stop.

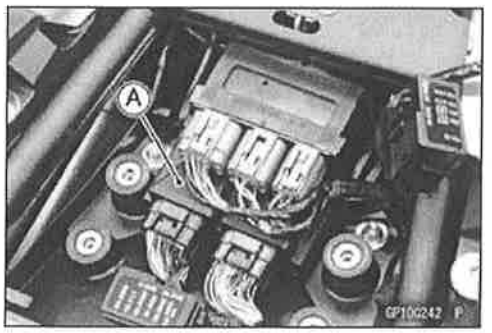
★If the engine does not stop, inspect the gear position switch, side stand switch and relay box.
★If their parts are normality, replace the ECU.

IC Igniter Inspection

○The IC igniter is built in the ECU [A].

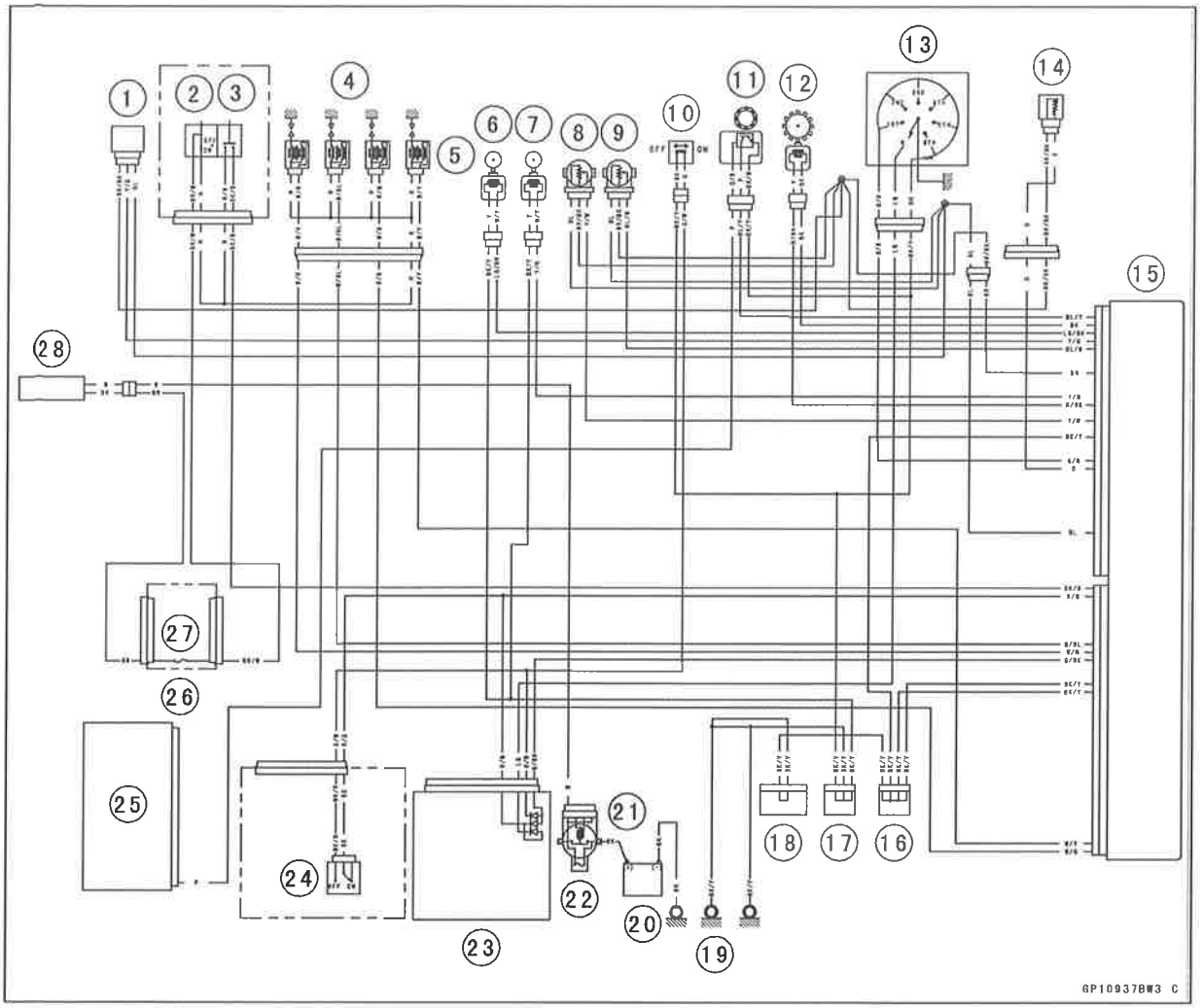
- Refer to the following items.

Interlock Operation Inspection (see Interlock Operation Inspection)
Ignition System Troubleshooting (see Ignition System Troubleshooting)
ECU Power Supply Inspection (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)



Ignition System

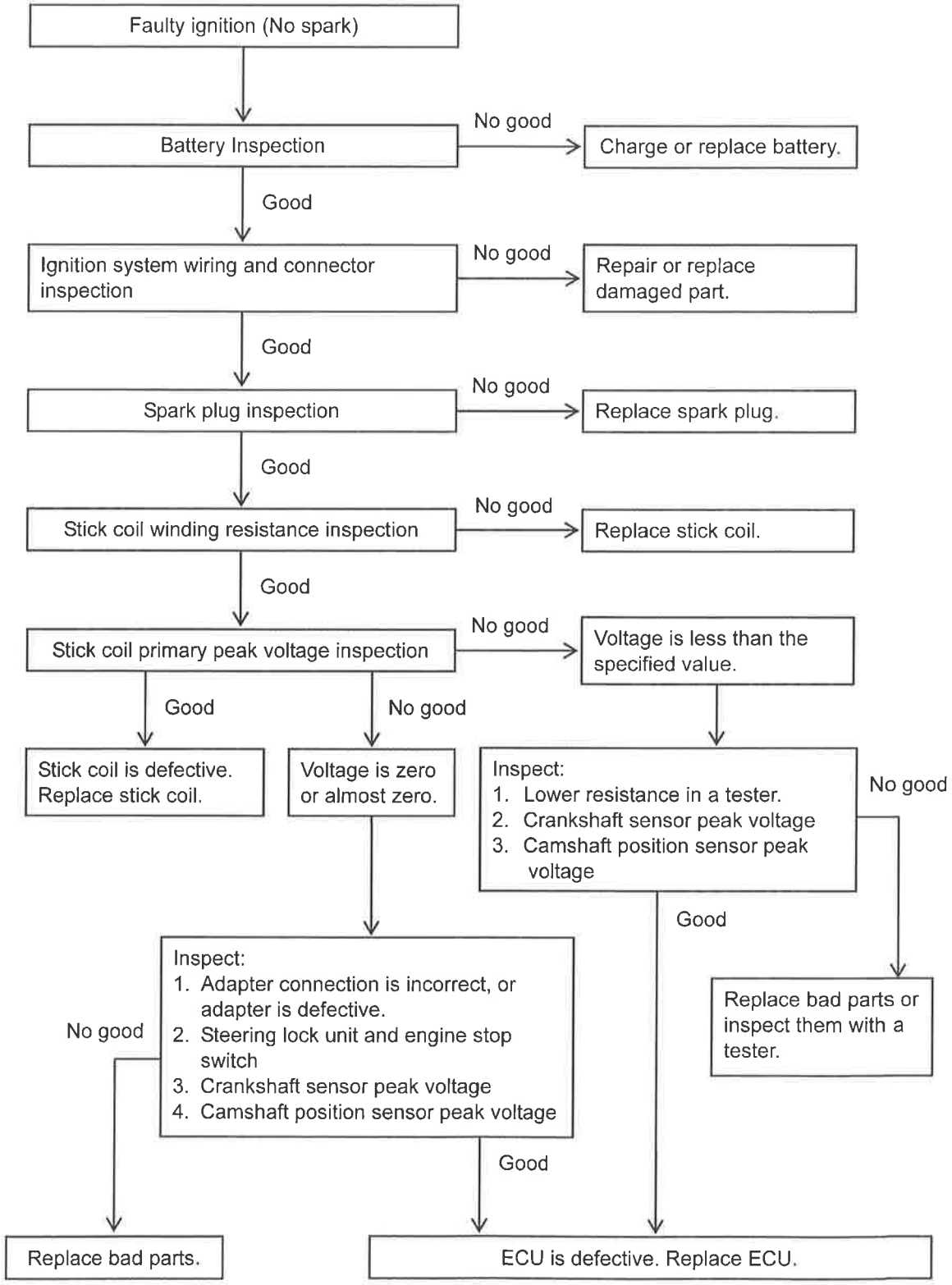
Ignition System Circuit



1. Vehicle-down Sensor
2. Engine Stop Switch
3. Starter Button
4. Spark Plugs
5. Stick Coils
6. Exhaust Camshaft Position Sensor
7. Intake Camshaft Position Sensor
8. Main Throttle Sensor
9. Subthrottle Sensor
10. Side Stand Switch
11. Speed Sensor
12. Crankshaft Sensor
13. Gear Position Switch
14. Water Temperature Sensor
15. ECU
16. Joint Connector 3
17. Joint Connector 8
18. Joint Connector 9
19. Frame Ground
20. Battery 12 V 14 Ah
21. Starter Relay
22. Main Fuse 30 A
23. Relay Box
24. Starter Lockout Switch
25. Meter Unit
26. Fuse Box 2
27. Ignition Fuse 15 A
28. Steering Lock Unit

Ignition System

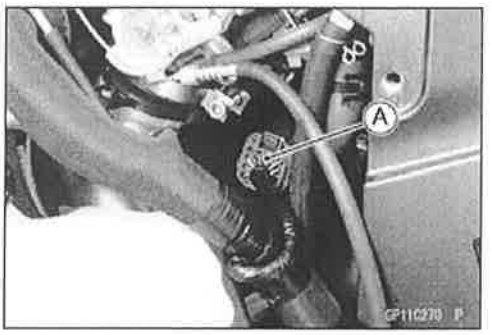
Ignition System Troubleshooting



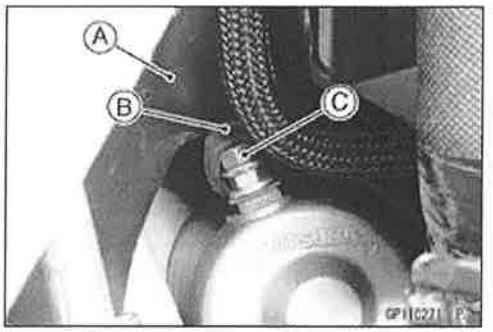
Electric Starter System

Starter Motor Removal

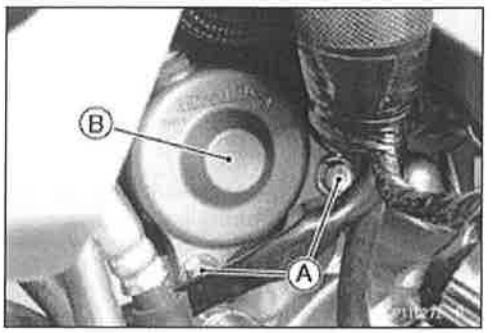
- Remove:
  Left Subframe (see Subframe Removal in the Frame chapter)
  Speed Sensor (see Speed Sensor Removal)
- Disconnect:
  Throttle Body Subharness Connector [A]



- Pull up the heat insulation rubber plate [A].
- Slide off the rubber cap [B].
- Remove:
  Starter Motor Cable Terminal Nut [C]
  Starter Motor Cable

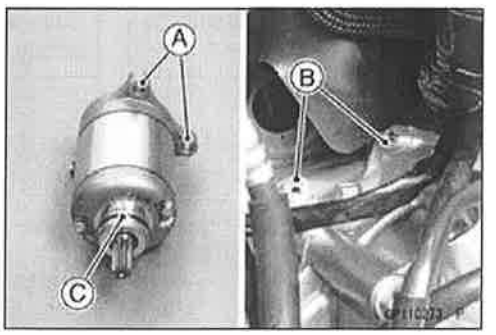


- Remove:
  Starter Motor Mounting Bolts [A]
  Starter Motor [B]



Starter Motor Installation

NOTICE
Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.



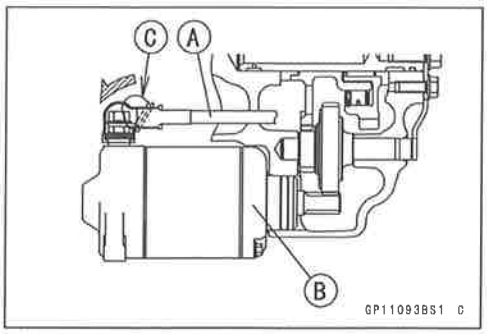
- Clean the starter motor legs [A] and crankcase [B] where the starter motor is ground.
- Replace the O-ring [C] with a new one.
- Apply grease to the new O-ring.
- Tighten:

Torque - Starter Motor Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Electric Starter System

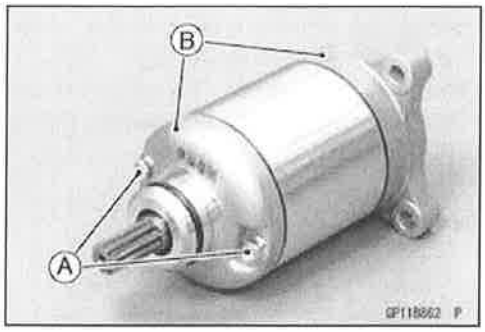
- Install the starter motor cable [A] side by side with starter motor [B].
- Tighten:

  Torque - Starter Motor Cable Terminal Nut: 5.9 N·m (0.60 kgf·m, 52 in·lb)
- Slide back the rubber cap [C] to the original position.

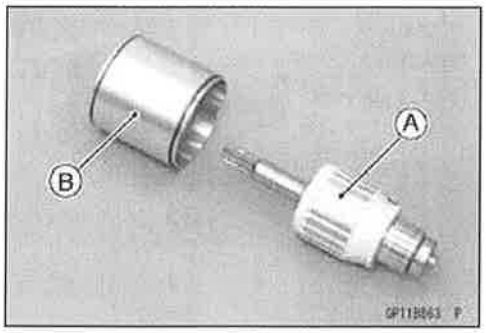


Starter Motor Disassembly

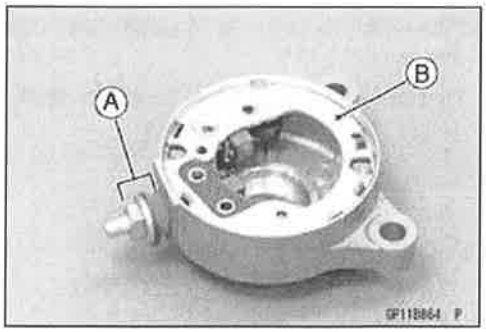
- Remove the starter motor (see Starter Motor Removal).
- Take off the starter motor through bolts [A] and remove both end covers [B].



- Pull the armature [A] out of the yoke [B].

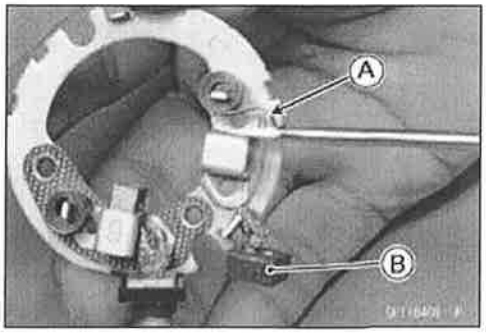


- Remove:
  Starter Motor Terminal Locknut, Washer and Insulators [A]
  Brush Plate Assembly [B]



Starter Motor Assembly

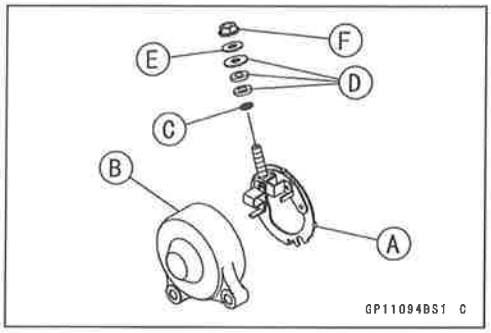
- Pry the spring end [A] and insert the brush [B].



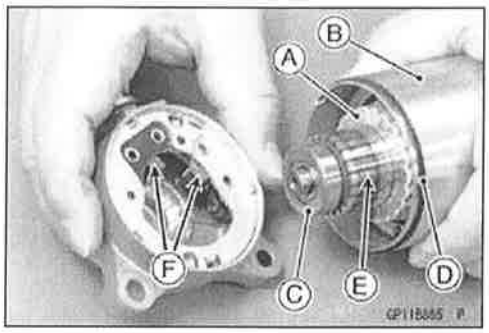
Electric Starter System

- Install the brush plate assembly [A] into the right-hand end cover [B].
- Replace the O-ring [C] with a new one.
- Install:
  Insulators [D]
  Washer [E]
- Tighten:

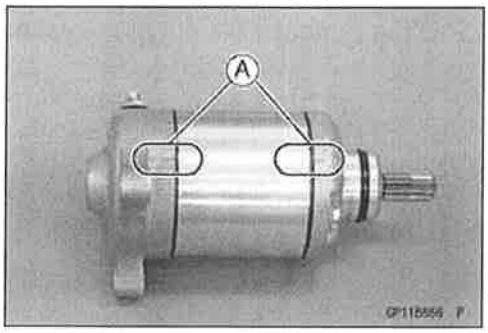
Torque - Starter Motor Terminal Locknut [F]: 6.9 N·m (0.70 kgf·m, 61 in·lb)



- Install the armature [A] into the yoke [B].
- Install thrust washer(s) [C].
- Replace the O-rings [D] with new ones.
- Put the commutator [E] among the brushes [F].

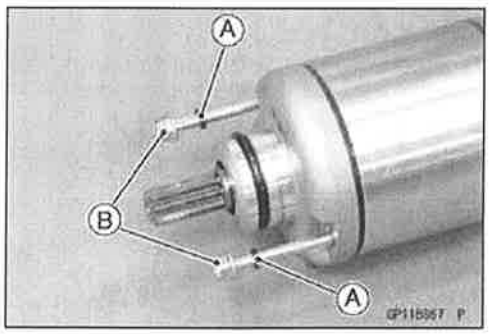


- Align the marks [A] to assemble the yoke and the end covers.

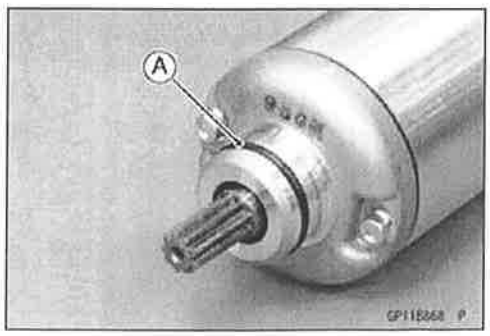


- Replace the O-rings [A] with new ones.
- Tighten:

Torque - Starter Motor Through Bolts [B]: 3.4 N·m (0.35 kgf·m, 30 in·lb)

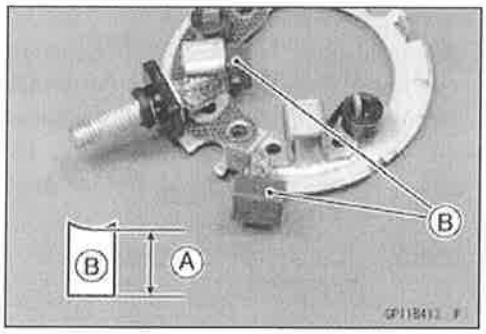


- Replace the O-ring [A] with a new one.
- Apply soap and water solution to the new O-ring.



Electric Starter System

Brush Inspection

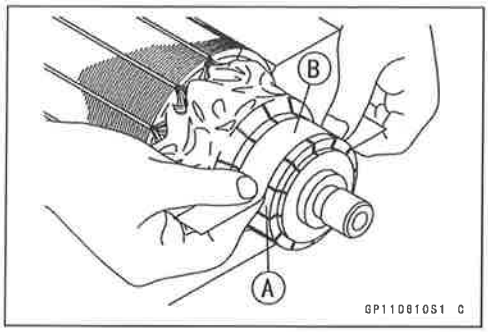


- Measure the length [A] of each brush [B].

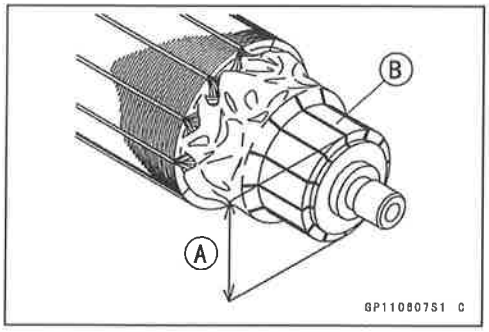
★If any is worn down to the service limit, replace the brush holder assembly.

Starter Motor Brush Length
Standard: 10 mm (0.39 in.)
Service Limit: 5 mm (0.20 in.)

Commutator Cleaning and Inspection



- Smooth the commutator surface [A] if necessary with fine emery cloth (#400 ~ 500) [B], and clean out the grooves.

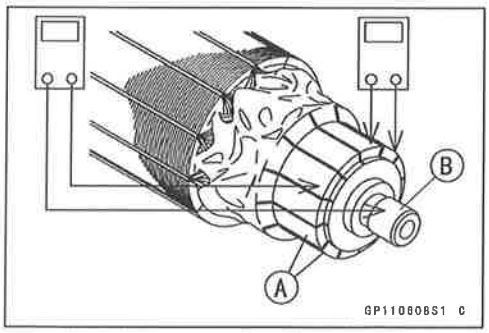


- Measure the diameter [A] of the commutator [B].

★If the commutator diameter is less than the service limit, replace the starter motor with a new one.

Commutator Diameter
Standard: 28 mm (1.10 in.)
Service Limit: 27 mm (1.06 in.)

Armature Inspection



- Using a tester, measure the resistance between any two commutator segments [A].

★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.

- Using the highest tester range, measure the resistance between the segments and the shaft [B].

★If there is any reading at all, the armature has a short and the starter motor must be replaced.

NOTE

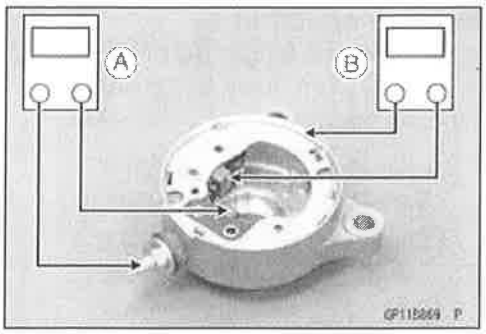
○*Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.*

Electric Starter System

Brush Lead Inspection

- Using a tester, measure the resistance as shown.
  Terminal Bolt and Positive Brush [A]
  Right-hand End Cover and Negative Brush [B]

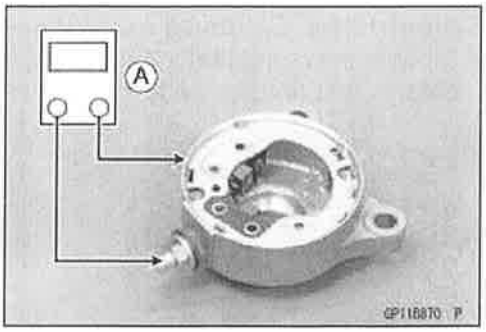
★If there is not close to zero ohms, the brush lead has an open. Replace the brush holder assembly.



Right-hand End Cover Assembly Inspection

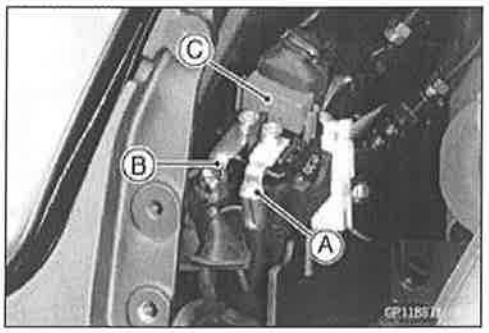
- Using the highest tester range, measure the resistance as shown.
  Terminal and Right-hand End Cover [A]

★If there is any reading, the right-hand end cover assembly have a short. Replace the right-hand end cover assembly.



Starter Relay Inspection

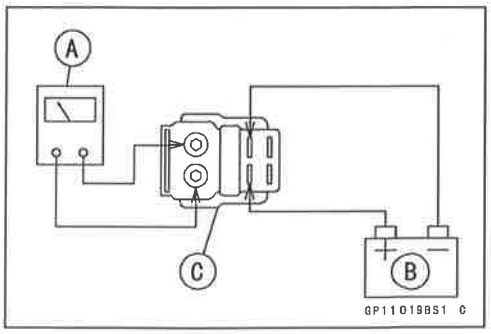
- Remove the battery (see Battery Removal).
- Disconnect the starter motor cable [A] and battery positive (+) cable [B] from the starter relay.
- Disconnect the connector [C].
- Pull out the starter relay from the damper.



- Connect a tester [A] and 12 V battery [B] to the starter relay [C] as shown.

★If the relay does not work as specified, replace the relay.

Testing Relay
Tester Range: × 1 Ω
Criteria: When battery is connected → 0 Ω
When battery is disconnected → ∞ Ω

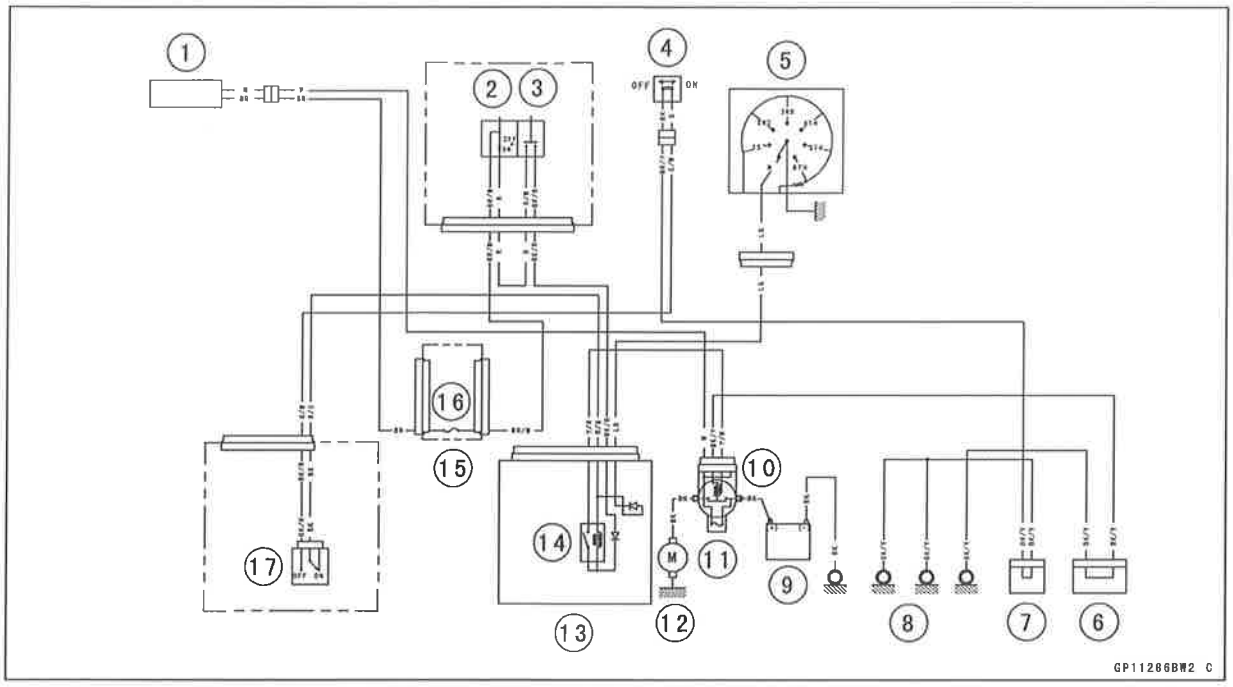


- Tighten:

Torque - Starter Relay Terminal Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)

Electric Starter System

Electric Starter Circuit



1. Steering Lock Unit
2. Engine Stop Switch
3. Starter Button
4. Side Stand Switch
5. Gear Position Switch
6. Joint Connector 1
7. Joint Connector 8
8. Frame Ground
9. Battery 12 V 14 Ah
10. Starter Relay
11. Main Fuse 30 A
12. Starter Motor
13. Relay Box
14. Starter Circuit Relay
15. Fuse Box 2
16. Ignition Fuse 15 A
17. Starter Lockout Switch

Lighting System

This motorcycle adopts the daylight system and has a headlight relay in the relay box. The headlight does not go on when the key knob and the engine stop switch are first turned on. The headlight comes on after the starter button is released and stays on until the key knob is turned off. The headlight will go out momentarily whenever the starter button is pressed and come back on when the button is released.

Headlight Beam Horizontal Adjustment

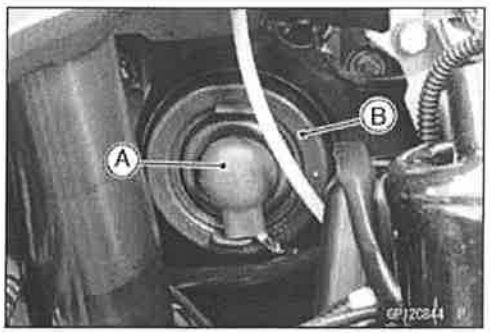
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Beam Vertical Adjustment

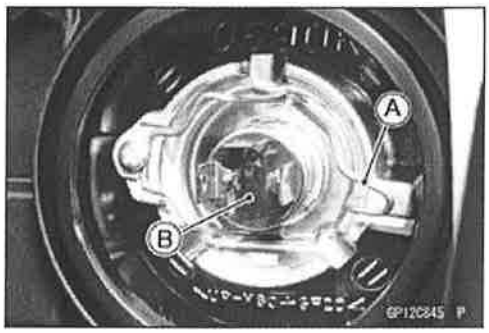
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Bulb Replacement

- Remove:
  Inner Covers (see Inner Cover Removal in the Frame chapter)
  Headlight Connector [A]
  Dust Cover [B]



- Remove:
  Hook [A]
  Headlight Bulb [B]



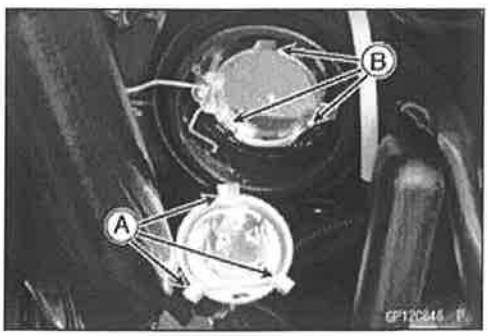
NOTICE

When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

NOTE

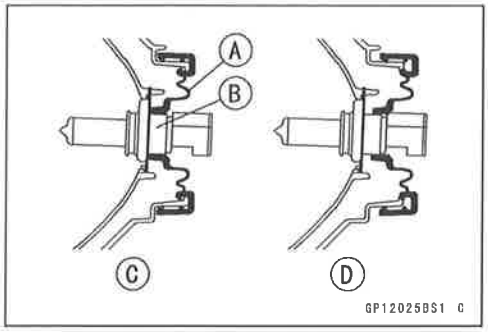
○*Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.*

- Replace the headlight bulb.
- Fit the projections [A] of the bulb in the hollows [B] of the headlight.
- Hold the bulb with the hook.



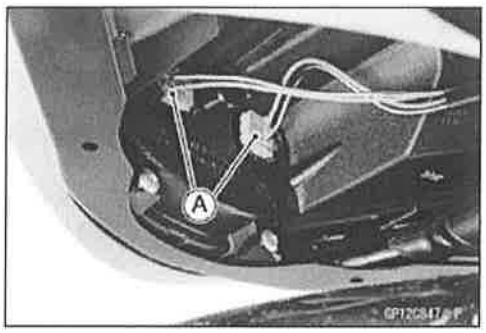
Lighting System

- Fit the dust cover [A] onto the bulb [B] firmly as shown.
  Correct [C]
  Incorrect [D]
- Connect the headlight connector.
- After installation, adjust the headlight aim (see Headlight Aiming Inspection in the Periodic Maintenance chapter).



City Light Bulb Replacement

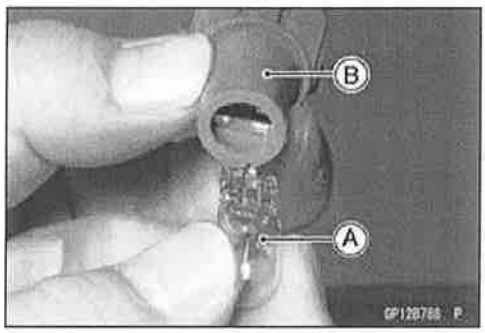
- Remove the upper inner fairing (see Upper Inner Fairing Removal in the Frame chapter).
- Pull out the sockets [A] together with the bulbs.



- Pull the bulb [A] out of the socket [B].

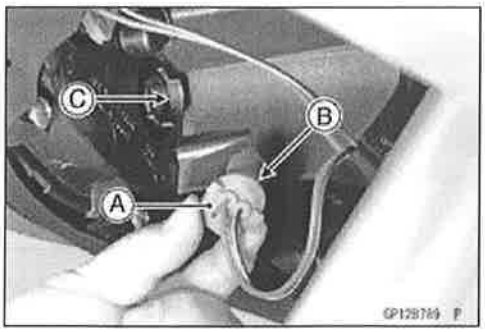
NOTICE

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.



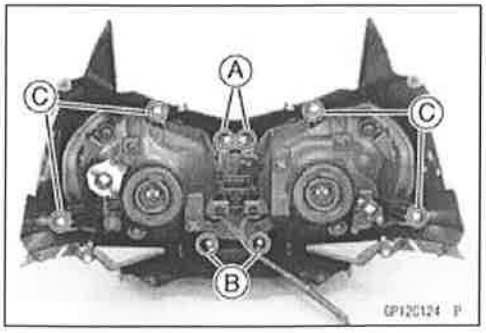
- Replace the bulb with a new one.

- Insert the socket [A] so that the round side [B] fits the wall [C].



Headlight Removal

- Remove:
  Upper Fairing (see Upper Fairing Removal in the Frame chapter)
  Headlight Bracket Screws [A] (Tapping Screws)
  Intake Air Duct Fairing Mounting Screws [B] (Tapping Screws)
  Headlight Mounting Screws [C]
  Headlight

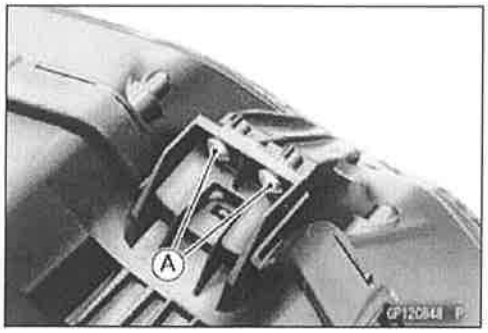


Lighting System

Headlight Installation

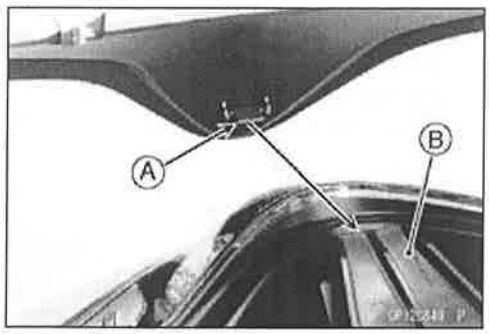
- Installation is the reverse of removal.
- Tighten:

Torque - Headlight Bracket Screws [A]: 1.2 N·m (0.12 kgf·m, 11 in·lb)



- Fit the tab [A] of the upper fairing and the slot of the headlight bracket [B].
- Tighten:

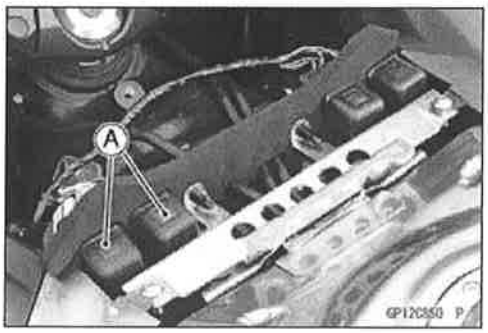
Torque - Headlight Mounting Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)
Intake Air Duct Fairing Mounting Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)



Headlight Relay Inspection

- Remove the front fuel tank cover (see Front Fuel Tank Cover Removal in the Frame chapter).
- Take off the headlight relays [A].

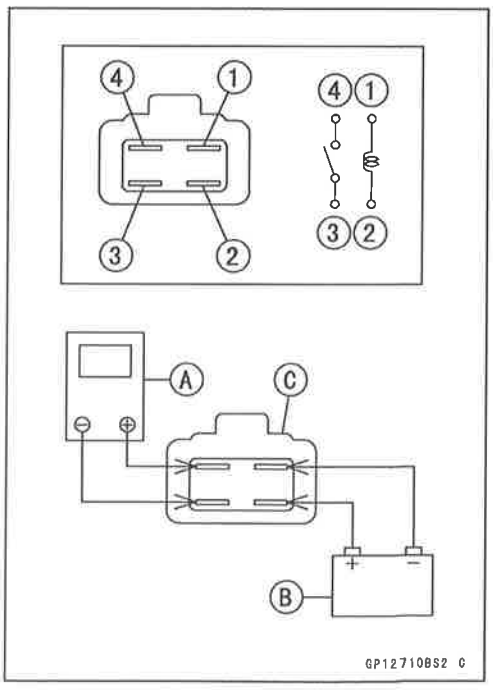
○The headlight relays (High and Low) are identical.



- Connect a tester [A] and 12 V battery [B] to the headlight relay [C] as shown.

★If the relay does not work as specified, replace the headlight relay.

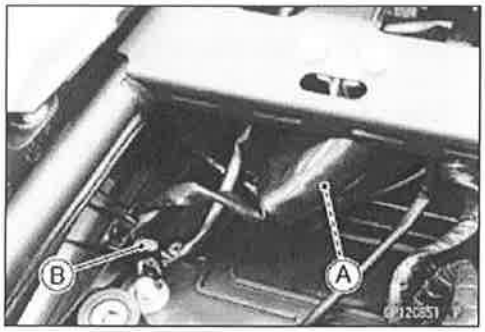
Testing Relay
Tester Range: × 1 Ω
Criteria: When battery is connected → 0 Ω
When battery is disconnected → ∞ Ω



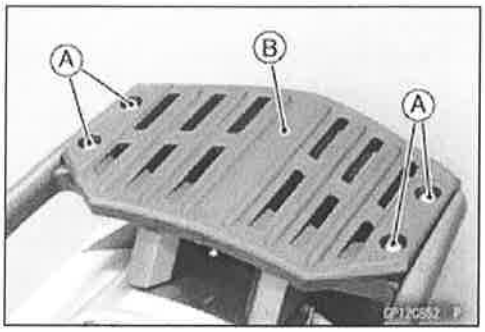
Lighting System

Tail/Brake Light (LED) Removal

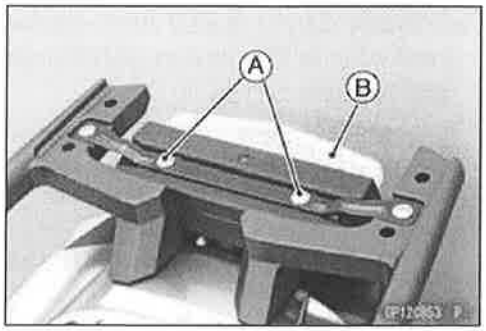
- Remove:
  Seat (see Seat Removal in the Frame chapter)
  ECU (see ECU Removal in the Fuel System (DFI) chapter)
- Disconnect:
  Tail/Brake Light Lead Connector [A]
- Open the clamp [B].



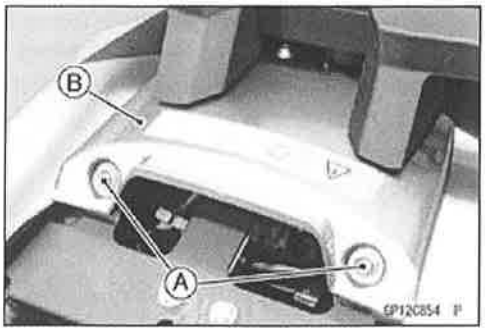
- Remove:
  Carrier Plate Bolts [A]
  Carrier Plate [B]



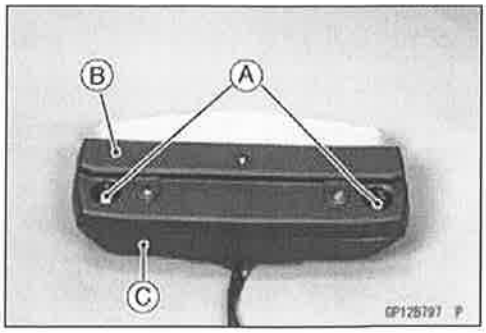
- Remove:
  Tail/Brake Light Assembly Mounting Bolts [A]
- Move the tail/brake light assembly [B] rearward.



- Remove:
  Tail Cover Bolts [A] and Washers
  Tail Cover [B]
- Remove the tail/brake light assembly.

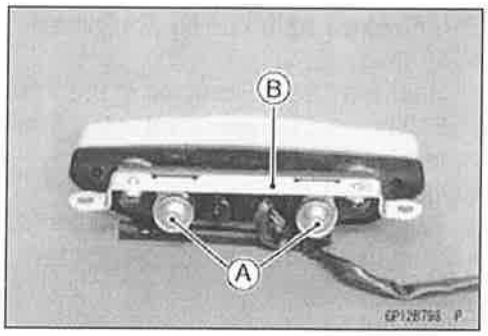


- Remove:
  Tail/Brake Light Cover Bolts [A]
  Upper Cover [B]
  Lower Cover [C]

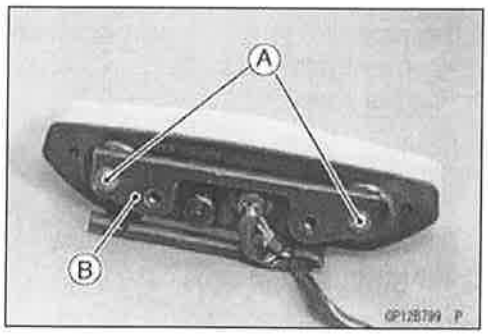


Lighting System

- Remove:
  Tail/Brake Light Mounting Bolts [A]
  Collars
  Dampers
  Tail/Brake Light Cover Bracket [B]



- Remove:
  Tail/Brake Light Bracket Screws [A]
  Tail/Brake Light Bracket [B]



Tail/Brake Light (LED) Installation

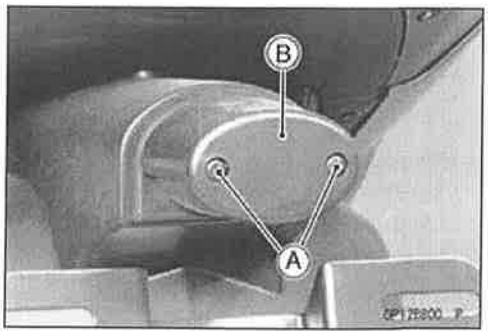
- Installation is the reverse of removal.
- Tighten:

Torque - Tail/Brake Light Bracket Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)
Tail/Brake Light Mounting Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)
Tail/Brake Light Cover Bolts: 1.2 N·m (0.12 kgf·m, 11 in·lb)
Tail Cover Bolts: 3.0 N·m (0.31 kgf·m, 27 in·lb)
Tail/Brake Light Assembly Mounting Bolts: 4.0 N·m (0.41 kgf·m, 35 in·lb)
Carrier Plate Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)

- Run the tail/brake light lead according to the Cable, Wire, and Hose Routing section in the Appendix chapter.
- Install the removed parts (see appropriate chapters).

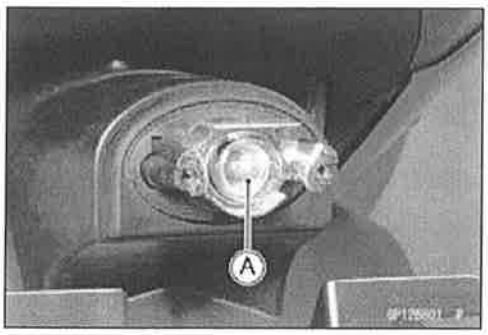
License Plate Light Bulb Replacement

- Remove:
  Screws [A]
  License Plate Light Cover [B] and Lens



Lighting System

- Push and turn the bulb [A] counterclockwise and remove it.
- Replace the bulb with a new one.

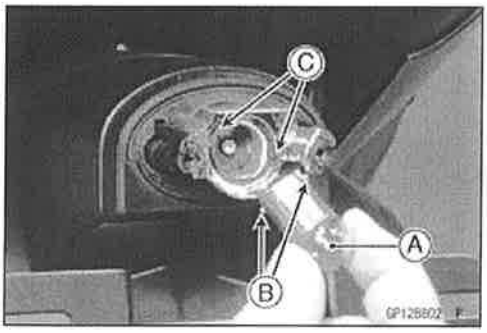


- Insert the new bulb [A] by aligning its pins [B] with the grooves [C] on the socket, and turn the bulb clockwise.

○Turn the bulb about 15°.

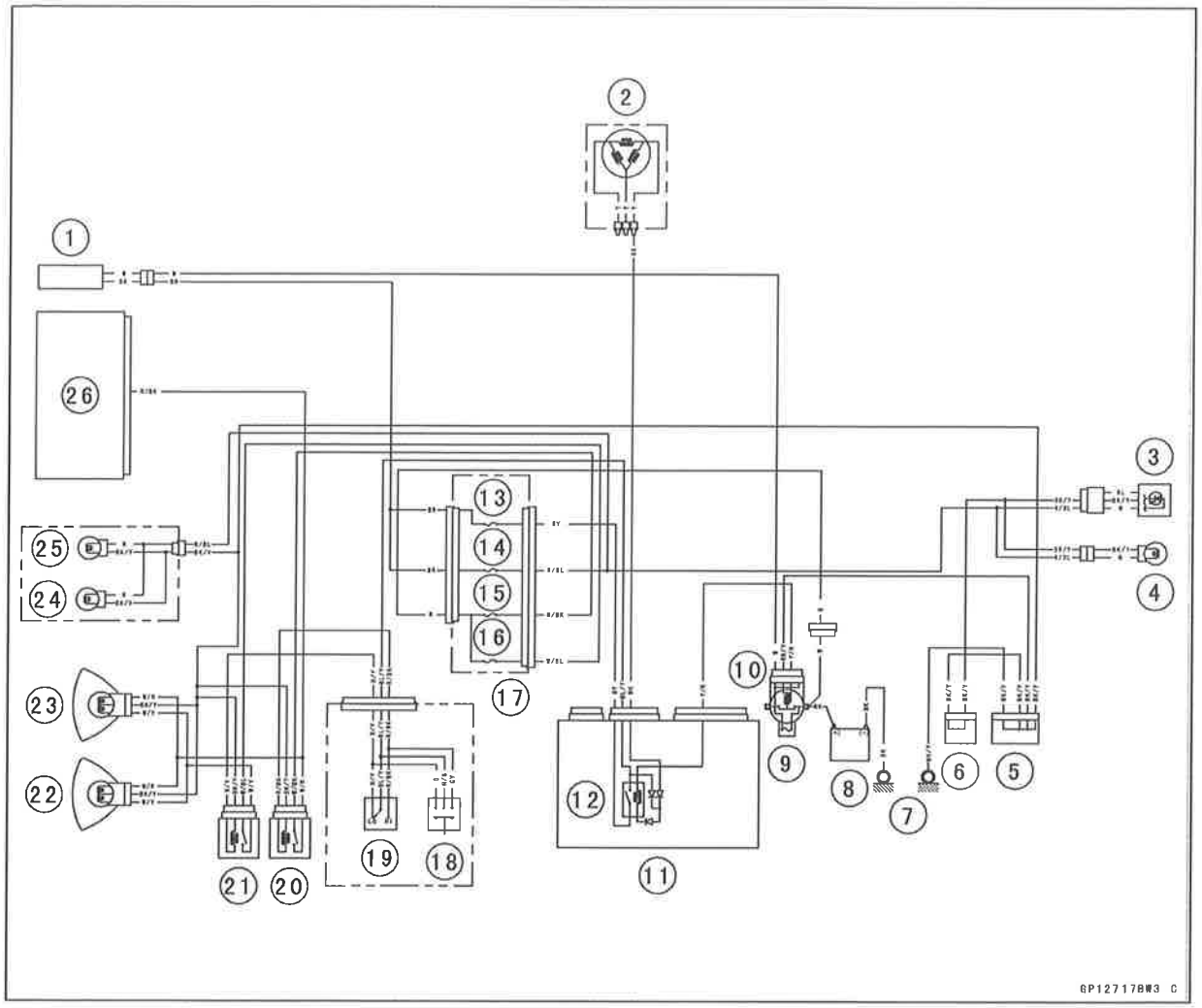
- Tighten:

Torque - License Plate Light Cover Mounting Screws: 0.90 N·m (0.09 kgf·m, 8 in·lb)



Lighting System

Headlight/Tail Light Circuit



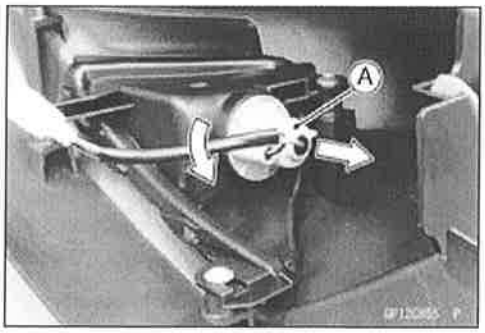
1. Steering Lock Unit
2. Alternator
3. Tail/Brake Light (LED)
4. License Plate Light 12 V 5 W
5. Joint Connector 1
6. Joint Connector 2
7. Frame Ground
8. Battery 12 V 14 Ah
9. Main Fuse 30 A
10. Starter Relay
11. Relay Box
12. Headlight Circuit Relay
13. Headlight Relay Fuse 10 A
14. Taillight Fuse 10 A
15. Headlight Fuse (High) 15 A
16. Headlight Fuse (Low) 15 A
17. Fuse Box 1
18. Passing Button
19. Dimmer Switch
20. Headlight Relay (High)
21. Headlight Relay (Low)
22. Headlight (Left) 12 V 60/55 W
23. Headlight (Right) 12 V 60/55 W
24. Left City Light 12 V 5 W
25. Right City Light 12 V 5 W
26. Meter Unit

Lighting System

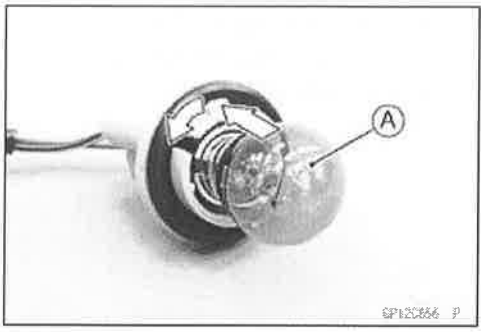
Turn Signal Light Bulb Replacement

Front Turn Signal Light

- Remove:
  Front Middle Fairings (see Middle Fairing Removal in the Frame chapter)
- Turn the socket [A] counterclockwise and pull out the socket together with the bulb.

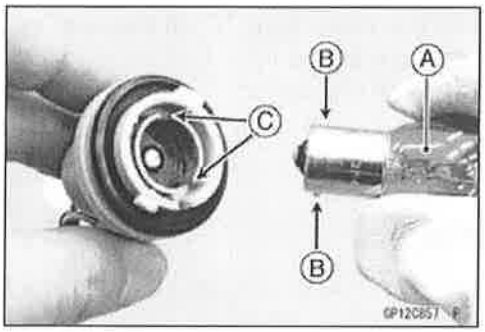


- Push and turn the bulb [A] counterclockwise and remove it.
- Replace the bulb with new ones.



- Insert the new bulb [A] by aligning its pins [B] with the grooves [C] on the socket, and turn the bulb clockwise.

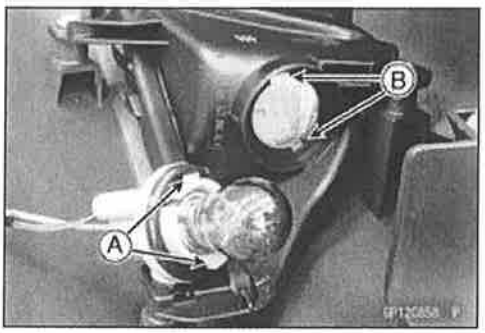
○Turn the bulb about 15°.



- Pushing the socket and turn it clockwise.

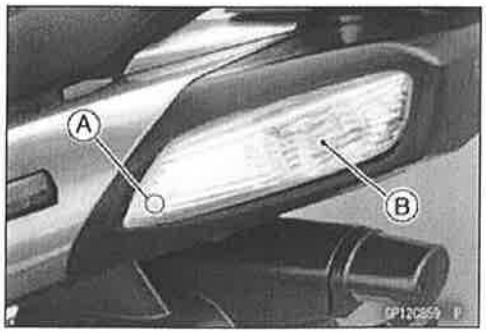
○Fit the projections [A] of the socket into the grooves [B] of the turn signal light.

- Install the middle fairings (see Middle Fairing Installation in the Frame chapter).



Rear Turn Signal Light

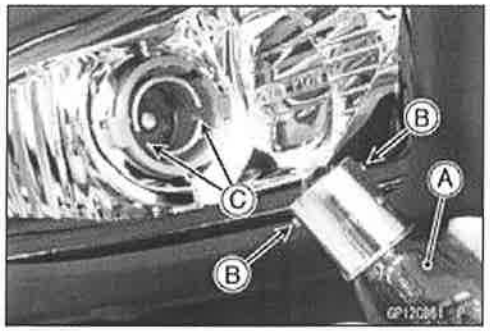
- Remove:
  Screw [A]
  Rear Turn Signal Light Lens [B]



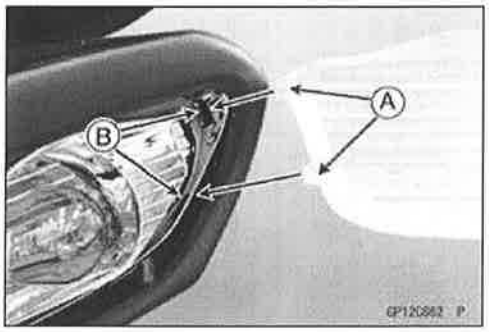
- Push and turn the bulb [A] counterclockwise and remove it.

- Insert the new bulb [A] by aligning its pins [B] with the grooves [C] on the socket, and turn the bulb clockwise.

○Turn the bulb about 15°.



- Fit the projections [A] of the lens into the grooves [B] of the turn signal light.
- Tighten the screw.

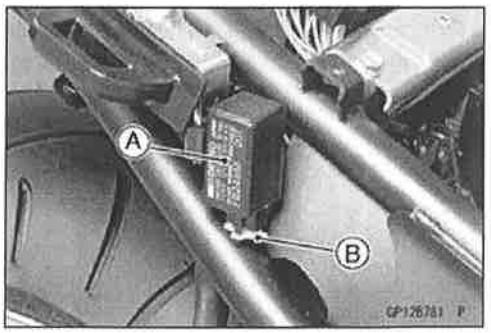


Turn Signal Relay Inspection

- Remove:

  Right Seat Cover (see Seat Cover Removal in the Frame chapter)

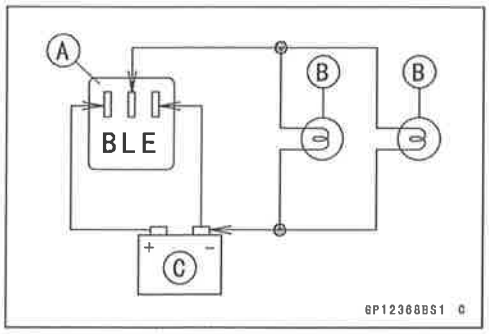
  Turn Signal Relay [A]
- Disconnect the connector [B].



Lighting System

- Connect one 12 V battery and turn signal lights as indicated in the figure, and count how may times the lights flash for one minute.
  Turn Signal Relay [A]
  Turn Signal Lights [B] (12 V 21 W × 2)
  12 V Battery [C]

★If the lights do not flash as specified, replace the turn signal relay.



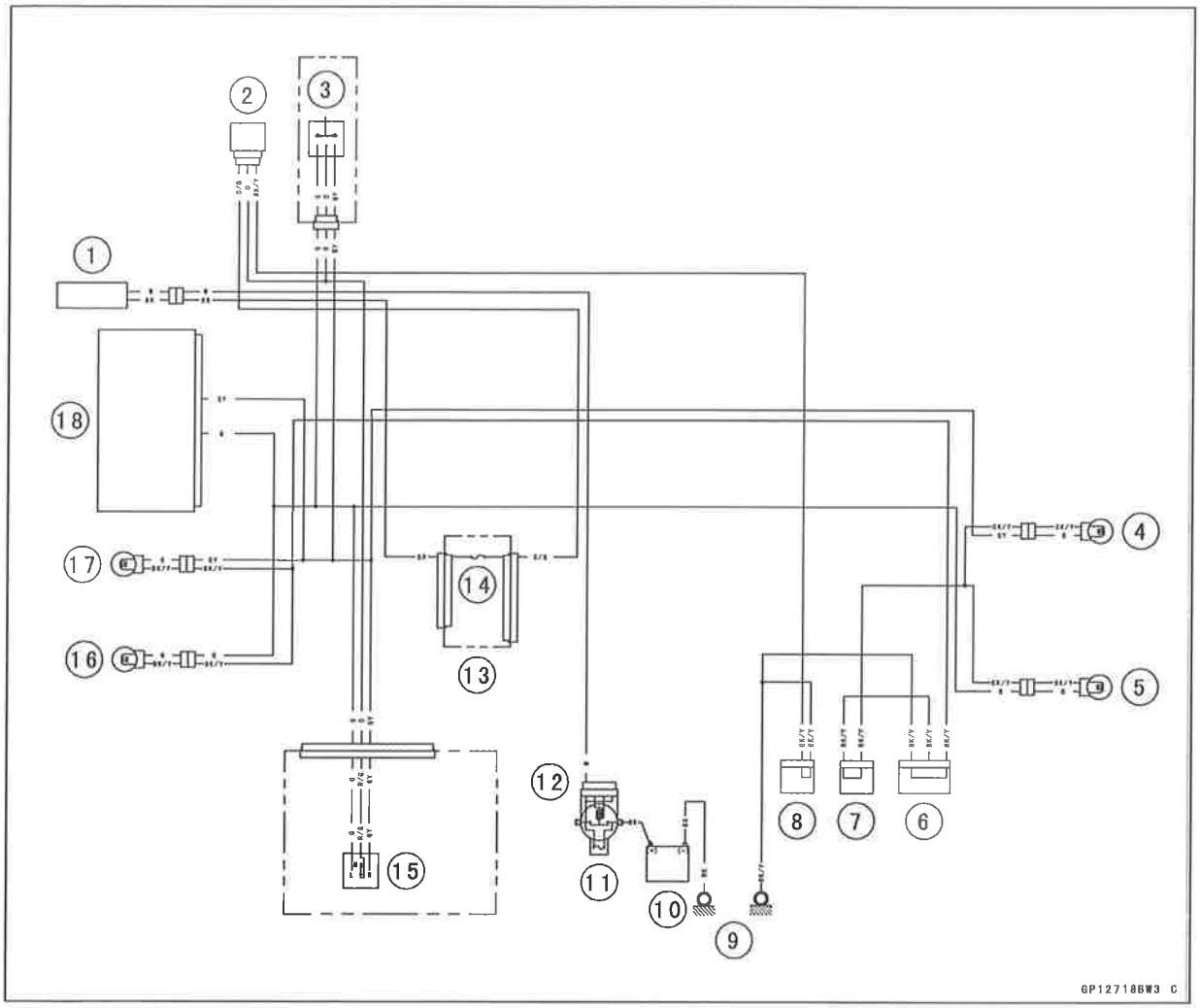
Testing Turn Signal Relay

Load		Flashing Times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	21	140 ~ 250
2	42	75 ~ 95

*: Cycle(s) per minute
**: Corrected to "one light burned out."

Lighting System

Turn Signal Light Circuit



1. Steering Lock Unit
2. Turn Signal Relay
3. Hazard Switch
4. Rear Right Turn Signal Light 12 V 21 W
5. Rear Left Turn Signal Light 12 V 21 W
6. Joint Connector 1
7. Joint Connector 2
8. Joint Connector 11
9. Frame Ground
10. Battery 12 V 14 Ah
11. Main Fuse 30 A
12. Starter Relay
13. Fuse Box 1
14. Turn Signal Relay Fuse 10 A
15. Turn Signal Switch
16. Front Left Turn Signal Light 12 V 21 W
17. Front Right Turn Signal Light 12 V 21 W
18. Meter Unit

Air Switching Valve

Air Switching Valve Operation Test

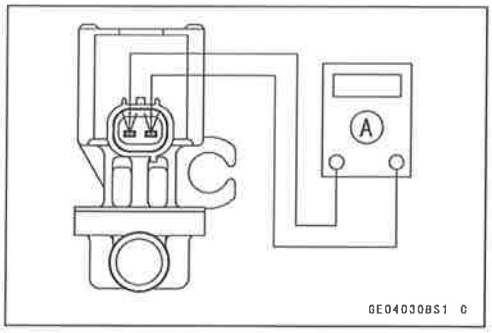
- Refer to the Air Suction System Damage Inspection in the Periodic Maintenance chapter.

Air Switching Valve Unit Test

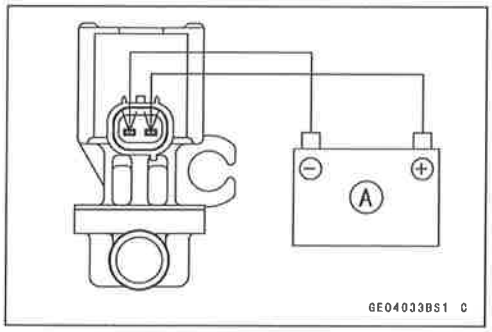
- Remove the air switching valve (see Air Switching Valve Removal in the Engine Top End chapter).
- Connect a tester [A] to the air switching valve terminals as shown.

Air Switching Valve Resistance
Standard: 20 ~ 24 Ω @20°C (68°F)

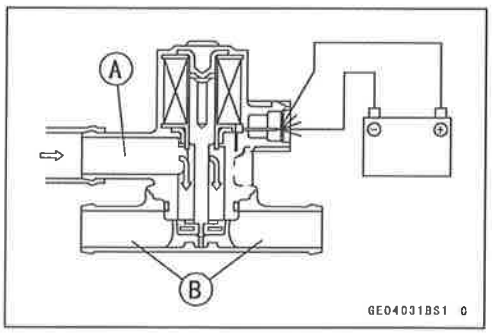
★If the resistance reading is except the specified value, replace it with a new one.



- Connect the 12 V battery [A] to the air switching valve terminals as shown.



- Blow the air to the intake air duct [A], and make sure does not flow the blown air from the outlet air ducts [B].

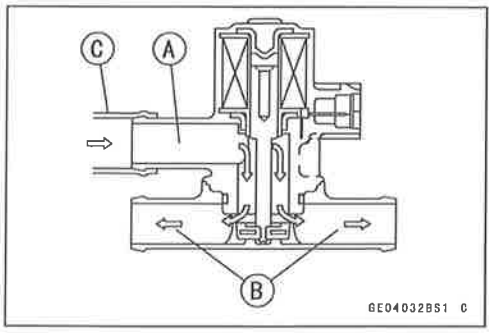


- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure flow the blown air from the outlet air ducts [B].

★If the air switching valve dose not operate as described, replace it with a new one.

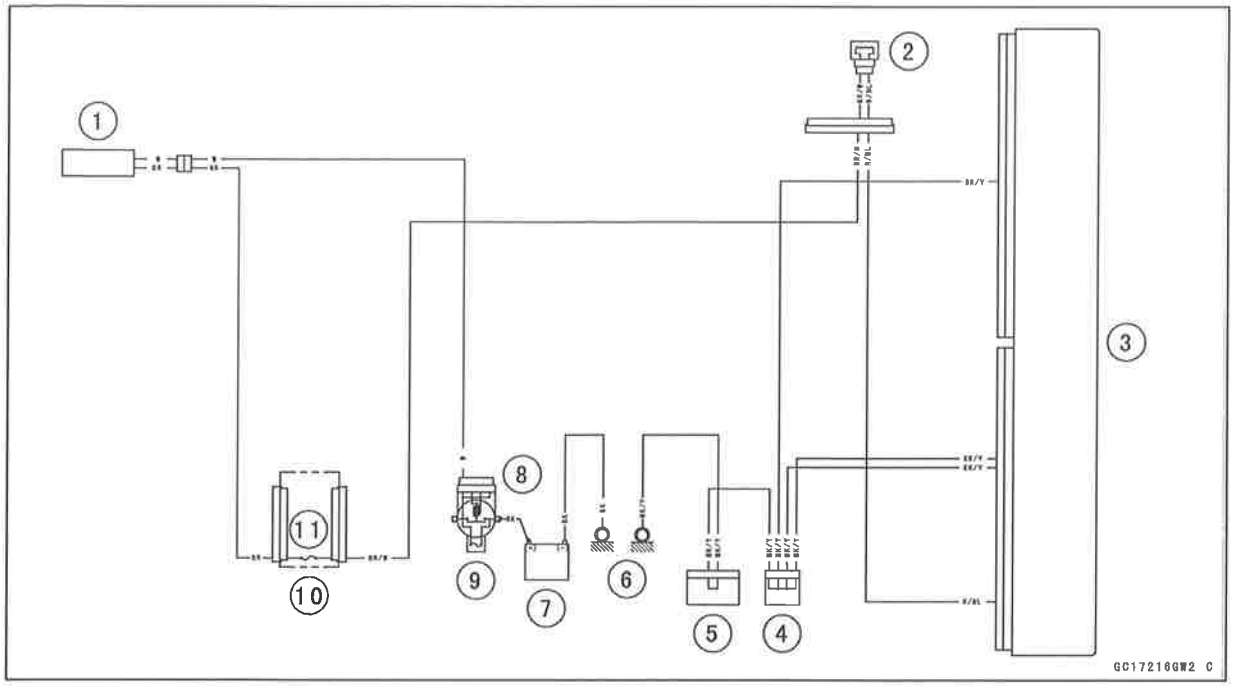
NOTE

○*To check air flow through the air switching valve, just blow through the air switching valve hose (intake side) [C].*



Air Switching Valve

Air Switching Valve Circuit



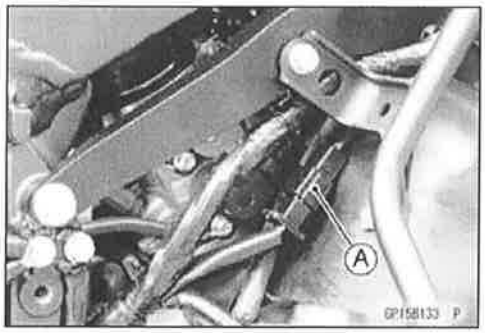
1. Steering Lock Unit
2. Air Switching Valve
3. ECU
4. Joint Connector 3
5. Joint Connector 9
6. Frame Ground
7. Battery 12 V 14 Ah
8. Starter Relay
9. Main Fuse 30 A
10. Fuse Box 2
11. Ignition Fuse 15 A

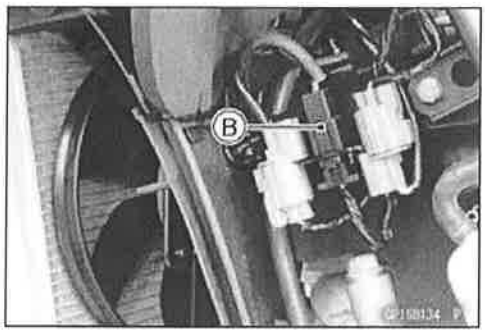
Radiator Fan System

Fan Motor Inspection

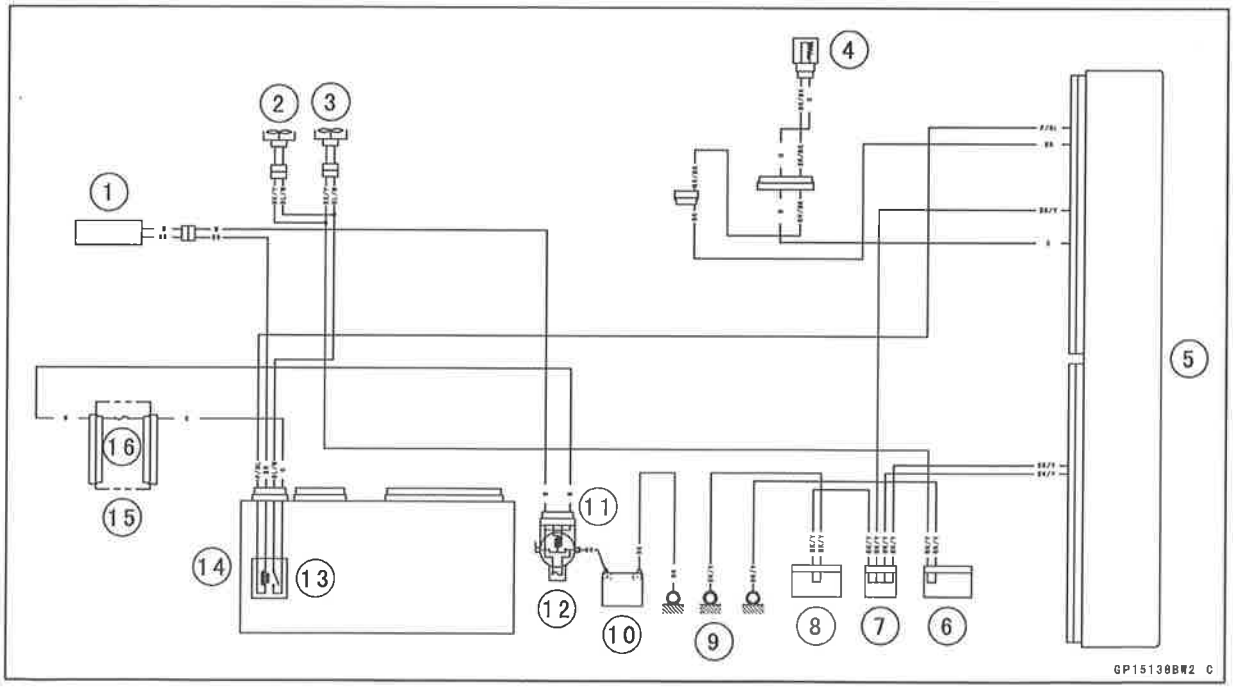
- Remove the front middle fairings (see Middle Fairing Removal in the Frame chapter).
- Disconnect the connectors.
  Right Fan Motor Lead Connector [A]
  Left Fan Motor Lead Connector [B]
- Using an auxiliary leads, supply battery power to the fan motor.

★If the fan does not rotate, the fan motor is defective and must be replaced.





Radiator Fan Circuit

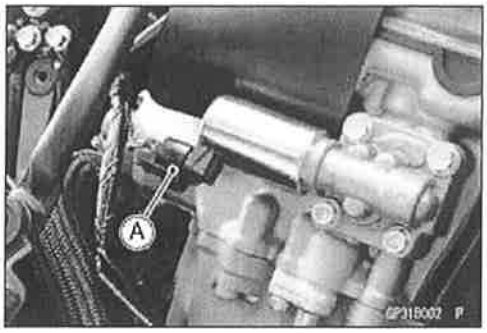


1. Steering Lock Unit
2. Fan Motor
3. Fan Motor
4. Water Temperature Sensor
5. ECU
6. Joint Connector 1
7. Joint Connector 3
8. Joint Connector 9
9. Frame Ground
10. Battery 12 V 14 Ah
11. Starter Relay
12. Main Fuse 30 A
13. Fan Relay
14. Relay Box
15. Fuse Box 2
16. Fan Fuse 15 A

Oil Control Solenoid Valve

Oil Control Solenoid Valve Inspection

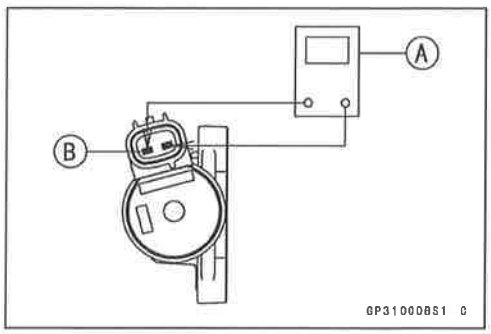
- Remove:
  Right Rear Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Disconnect the oil control solenoid valve lead connector [A].



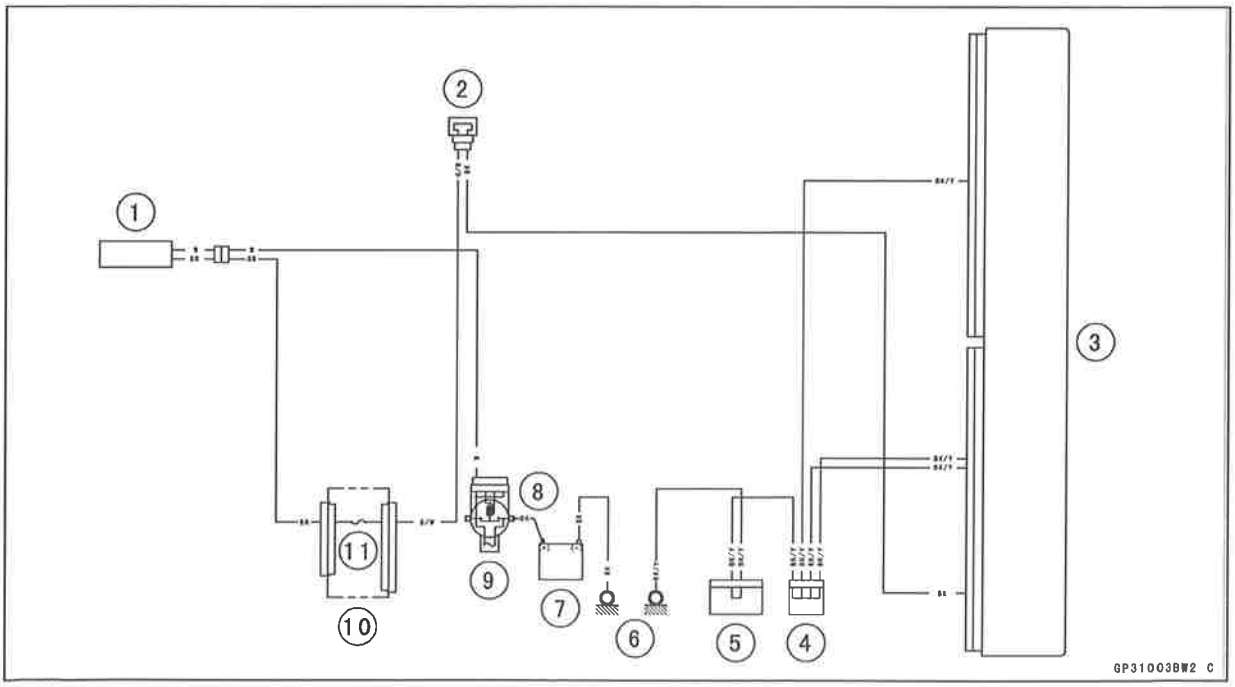
- Set a tester [A] and connect the tester leads to the terminals in the oil control solenoid valve lead connector [B].

Oil Control Solenoid Valve Resistance
Standard: 6.9 ~ 7.9 Ω @20°C (68°F)

★If the reading is out of the standard, replace the oil control solenoid valve.



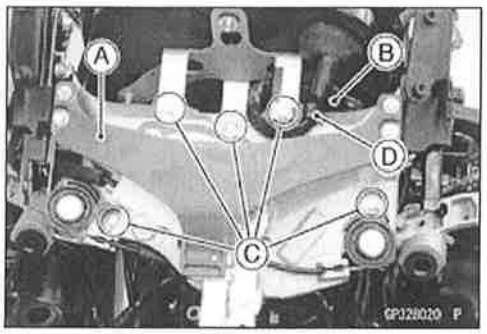
Oil Control Solenoid Valve Circuit



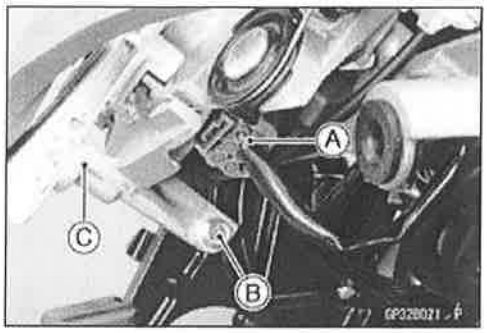
1. Steering Lock Unit
2. Oil Control Solenoid Valve
3. ECU
4. Joint Connector 3
5. Joint Connector 9
6. Frame Ground
7. Battery 12 V 14 Ah
8. Starter Relay
9. Main Fuse 30 A
10. Fuse Box 3
11. Oil Control Solenoid Valve Fuse 15 A

Electric Windshield

Electric Windshield Assembly Removal



- Remove:
  Upper Fairing (see Upper Fairing Removal in the Frame chapter)
- Position the windshield bracket [A] as shown.
- Remove:
  Clamp [B]
  Bolts [C]
  Clamp [D]



- Disconnect the electric windshield motor lead connector [A].
- Hold the electric windshield assembly and remove the bolt [B].
- Remove:
  Electric Windshield Assembly [C]

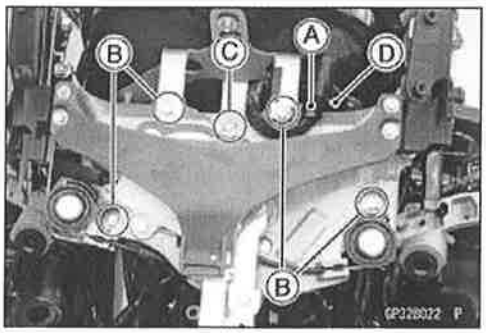
NOTE

○*Do not remove the bolt or nut in the electric windshield assembly excluding the above-mentioned bolts for removal.*

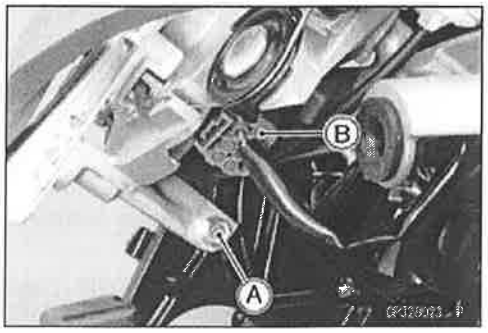
○*The electric windshield assembly is elaborately manufactured at the factory.*

○*If they are removed, the performance of electric windshield assembly will not be guaranteed.*

Electric Windshield Assembly Installation



- Install:
  Clamp [A]
  Bolts [B], L = 12 mm (0.47 in.)
  Bolt [C], L = 18 mm (0.71 in.)
- Hold the meter lead with the clamps [A] [D].



- Install:
  Bolt [A], L = 12 mm (0.47 in.)
- Tighten the bolts.

Torque - Electric Windshield Assembly Mounting Bolt (L = 18 mm): 7.0 N·m (0.71 kgf·m, 62 in·lb)
Electric Windshield Assembly Mounting Bolts (L = 12 mm): 8.0 N·m (0.82 kgf·m, 71 in·lb)

- Connect the electric windshield motor lead connector [B].

NOTE

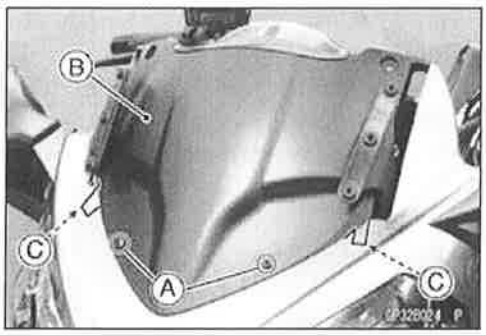
○*After connecting the electric windshield motor lead connector, move the windshield with the electric windshield switch and then turn the key knob to "OFF."*

- Install the removed parts (see appropriate chapters).

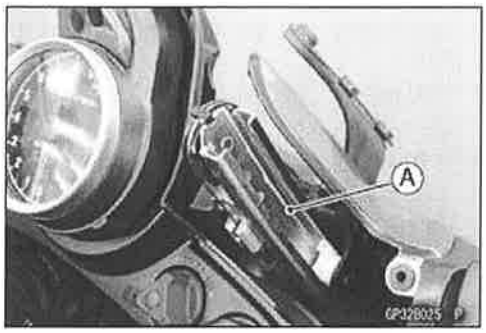
Electric Windshield

Electric Windshield Assembly Lubrication

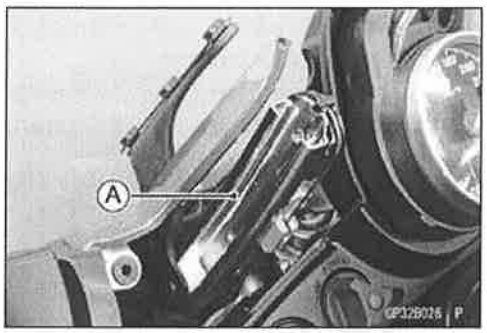
- Remove:
  Inner Covers (see Inner Cover Removal in the Frame chapter)
  Screws [A]
- Clear the upper edge of the electric windshield assembly cover [B].
- Slide the electric windshield assembly cover upward to clear the hooks [C].



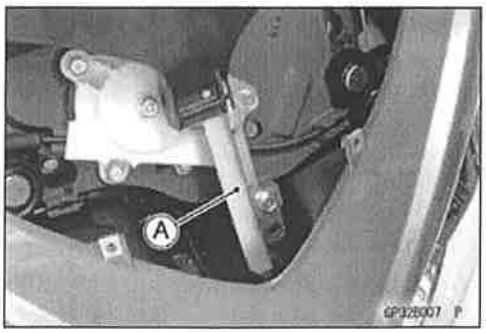
- Apply silicon grease to the right rail [A].



- Apply silicon grease to the left rail [A].



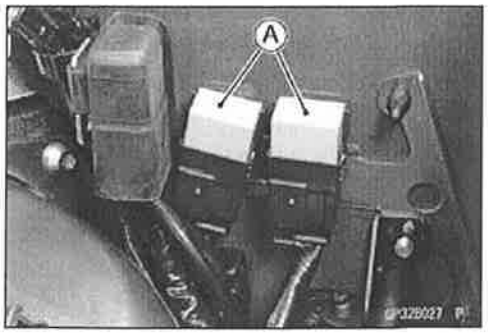
- Apply olefin grease to the center rail [A].



Electric Windshield Relay Inspection

- Remove:
  Left Inner Cover (see Middle Fairing Removal in the Frame chapter)
  Electric Windshield Relays [A]

○The electric windshield relays (up/down) are identical.

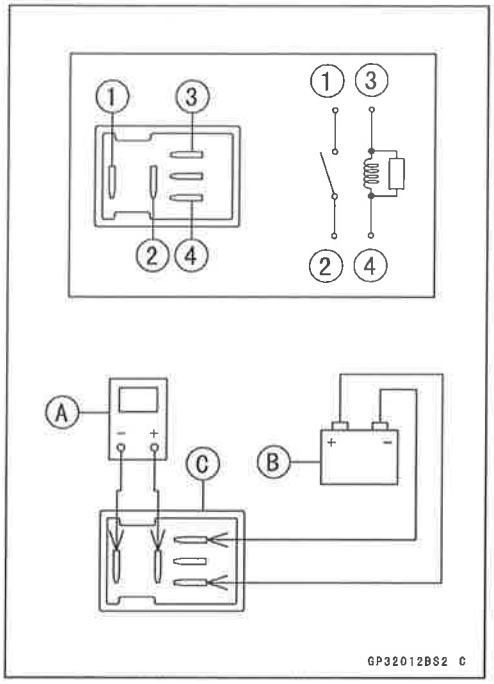


Electric Windshield

- Connect a tester [A] and 12 V battery [B] to the electric windshield relay [C] as shown.

★If the relay does not work as specified, replace the relay.

Testing Relay
Tester Range: × 1 Ω
Criteria: When battery is connected → 0 Ω
When battery is disconnected → ∞ Ω

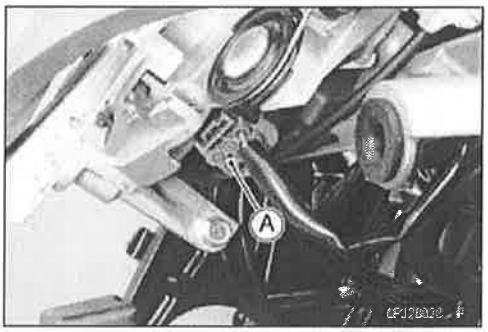


Electric Windshield Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove:
  Upper Fairing (see Upper Fairing Removal in the Frame chapter)
- Disconnect the electric windshield motor lead connector [A].
- Connect the tester (DC 25 V range) to the connector according to the table below.
- Measure the supply voltage to the electric windshield motor.



Connection and Measurements

Tester Connection (+)	(–)	Switch Position	Standard Voltage
Red	Green	Free	0 V
Red	Green	Up	Battery Voltage
Green	Red	Free	0 V
Green	Red	Down	Battery Voltage

★If the readings are standard, connect the electric windshield motor lead connector and push the electric windshield switch.

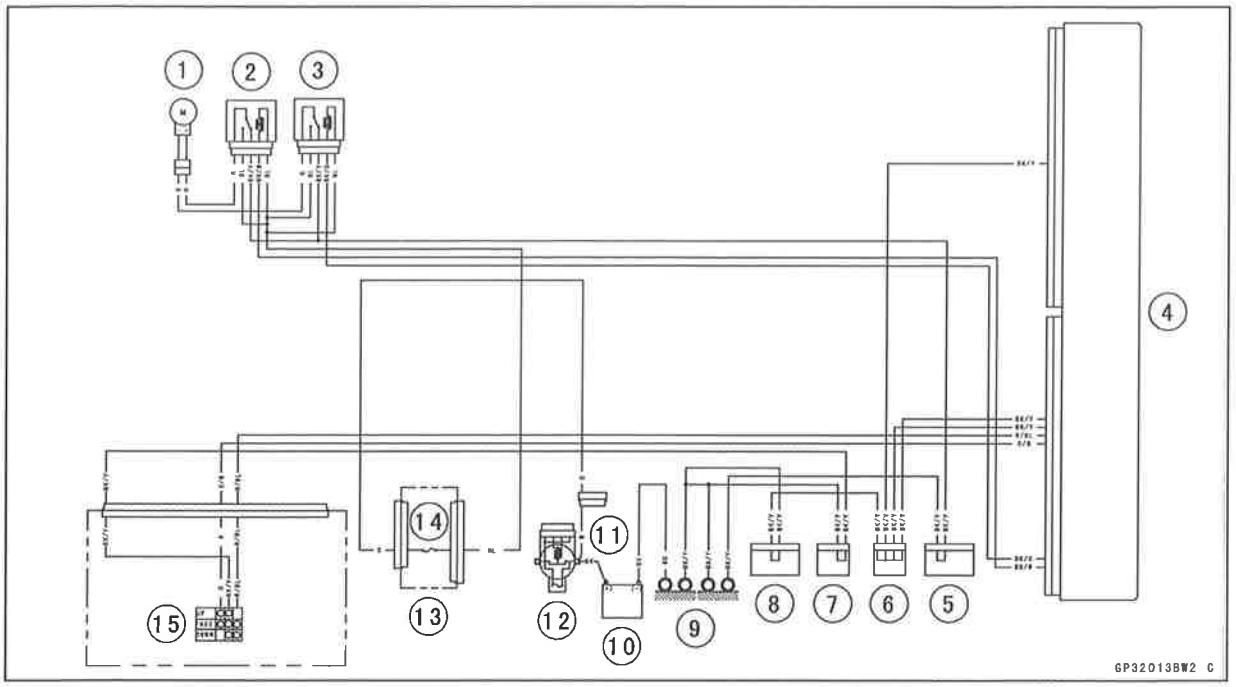
★If the wind shield does not move, replace the electric windshield assembly.

★If any reading is out of the standard, check the following parts.
Electric Windshield Fuse 30 A (see Fuse Inspection)
Electric Windshield Switch (see Switch Inspection)
Electric Windshield Relays (see Electric Windshield Relay Inspection)
Wiring (see wiring diagram in this section)

★If the above parts are good, replace the ECU (see ECU Removal in the Fuel System (DFI) chapter).

Electric Windshield

Electric Windshield Circuit

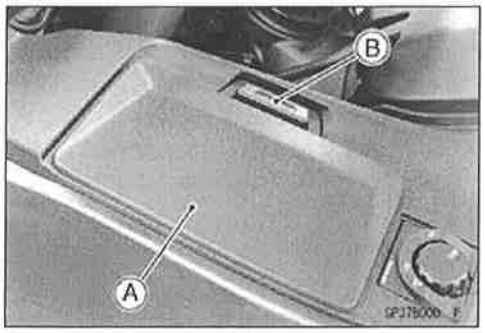


1. Electric Windshield Motor
2. Electric Windshield Relay (Up)
3. Electric Windshield Relay (Down)
4. ECU
5. Joint Connector 1
6. Joint Connector 3
7. Joint Connector 8
8. Joint Connector 9
9. Frame Ground
10. Battery 12 V 14 Ah
11. Starter Relay
12. Main Fuse 30 A
13. Fuse Box 3
14. Electric Windshield Fuse 30 A
15. Electric Windshield Switch

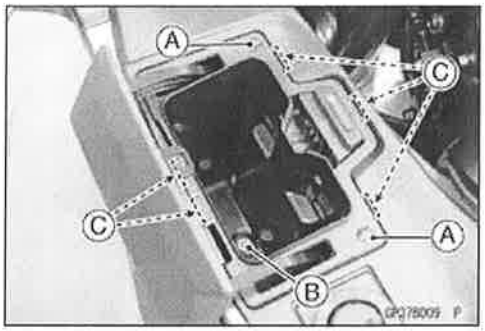
Storage Case Solenoid

Storage Case Solenoid Removal

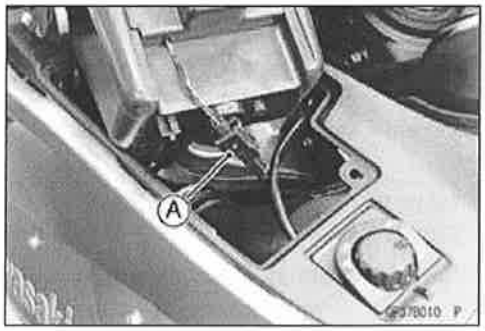
- Turn the key knob to "ON."
- Open the lid [A] by pushing the button [B].



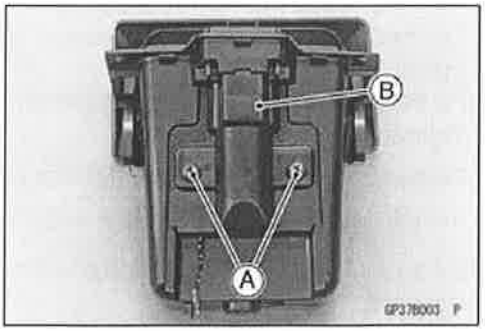
- Remove:
  Quick Rivets [A]
  Storage Case Bolt [B]
- Clear the hooks [C] of the storage case from the left inner cover.



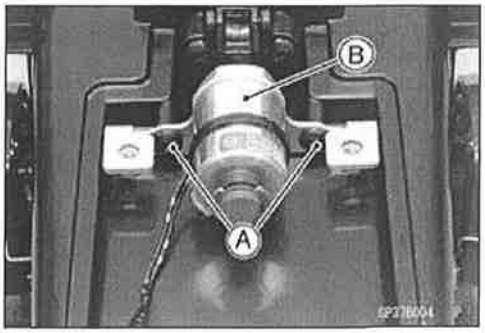
- Disconnect the storage case solenoid lead connector [A].



- Remove:
  Storage Case Solenoid Cover Screws [A]
  Storage Case Solenoid Cover [B]



- Remove:
  Storage Case Solenoid Screws [A]
  Storage Case Solenoid [B]

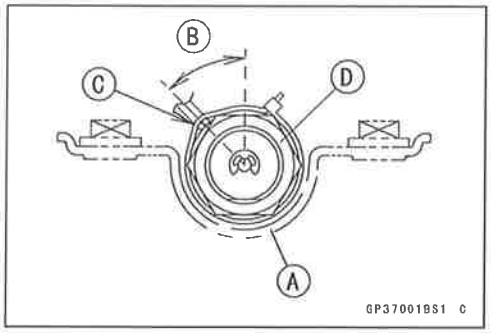


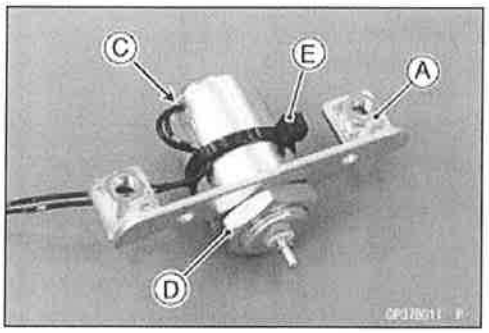
Storage Case Solenoid

Storage Case Solenoid Installation

- When installing the bracket [A], install it so that its position is 45 degrees [B] to base [C] of the leads as shown.
- Tighten the nut [D].

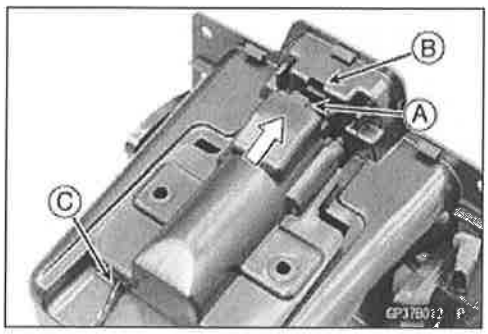
○The band stopper [E] must not come in contact with the storage case and cover.





- Install:
  Storage Case Solenoid
- Tighten:

Torque - Storage Case Solenoid Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)



- Insert the projection [A] of the cover into the slit [B].
- Tighten:

Torque - Storage Case Solenoid Cover Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Run the leads into the recess [C].
- Connect the storage case solenoid lead connector.
- Install the storage case.

○Fit the hooks to the slits on the inner cover.

- Tighten:

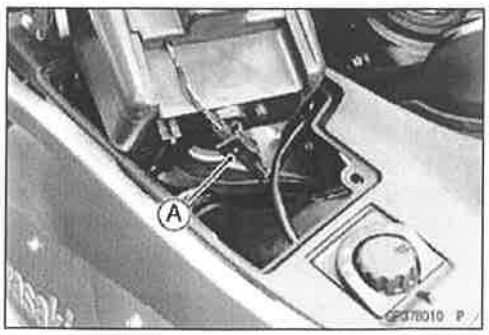
Torque - Storage Case Bolt: 4.0 N·m (0.41 kgf·m, 35 in·lb)

- Install the removed parts (see appropriate chapters).

Storage Case Solenoid Inspection

- Remove:
  Storage Case (see Storage Case Solenoid Removal)
- Set a tester and connect the tester leads to the terminals in the storage case solenoid lead connector [A].

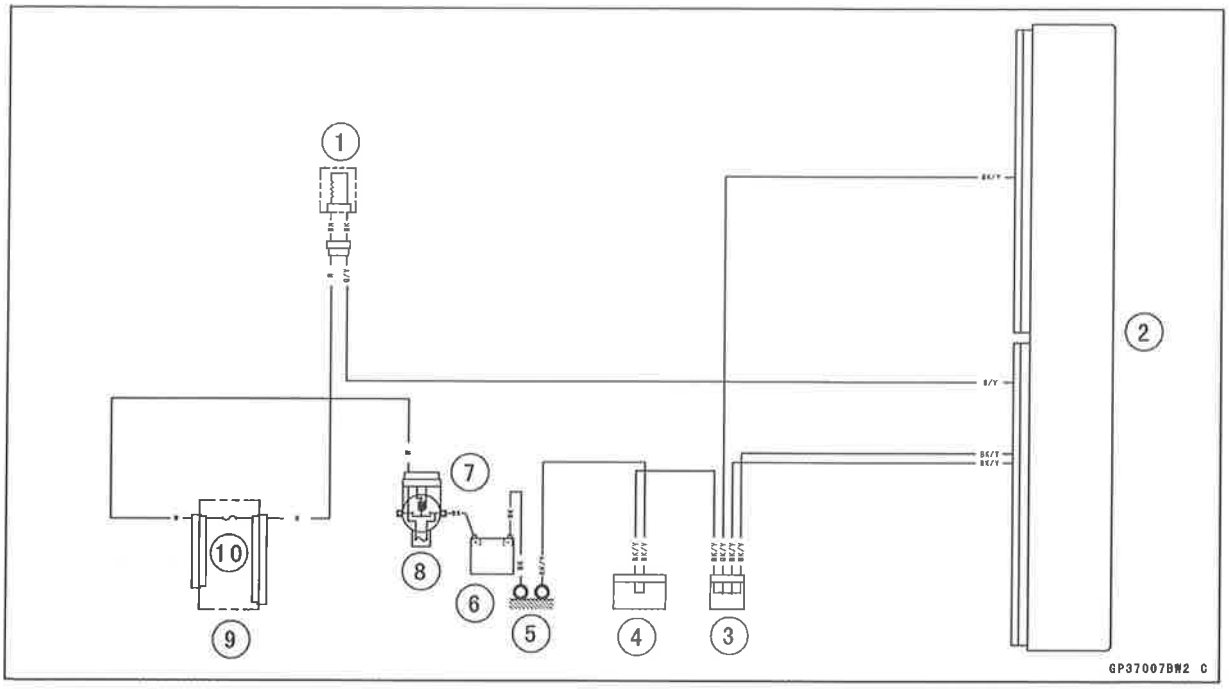
Storage Case Solenoid Resistance
Standard: 27.9 ~ 34.1 Ω @20°C (68°F)



★If the reading is out of the standard, replace the storage case solenoid.

Storage Case Solenoid

Storage Case Solenoid Circuit



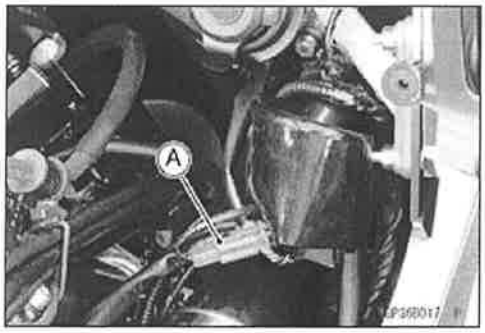
1. Storage Case Solenoid
2. ECU
3. Joint Connector 3
4. Joint Connector 9
5. Frame Ground
6. Battery 12 V 14 Ah
7. Starter Relay
8. Main Fuse 30 A
9. Fuse Box 3
10. KIPASS Signal Relay Fuse 10 A

Grip Warmer

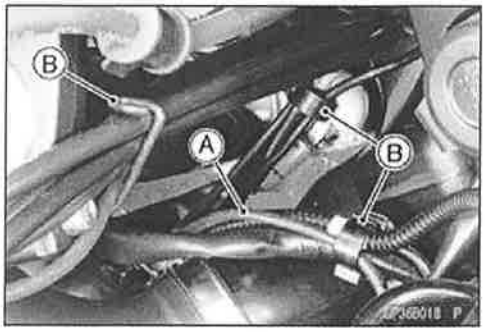
Grip Warmer Removal

Right Side

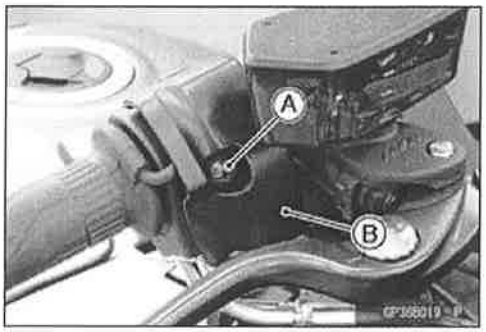
- Remove:
  Right Inner Cover (see Inner Cover Removal in the Frame chapter)
- Disconnect:
  Right Grip Warmer Lead Connector [A]



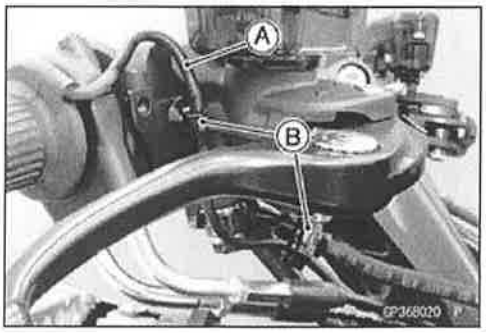
- Free the grip warmer lead [A] from the clamps [B].



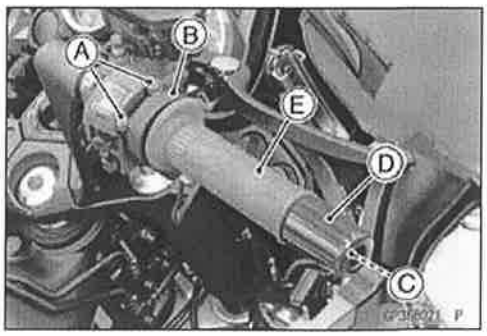
- Remove:
  Screw [A]
  Cover [B]



- Free the grip warmer lead [A] from the clamps [B].



- Remove:
  Bolts [A]
  Throttle Cases [B] and Cables
  Throttle Cable Upper Ends
  Weight Bolt [C]
  Weight [D]
  Right Grip Warmer Assembly [E]

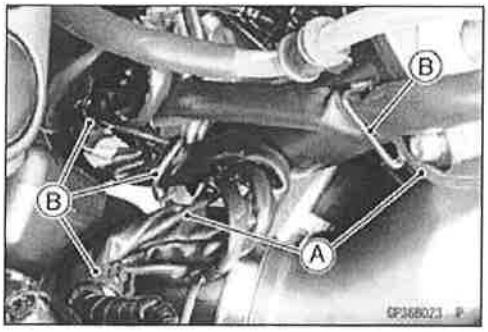


Grip Warmer

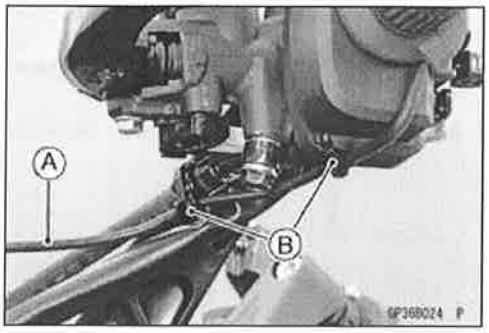
Left Side

- Remove:
  Left Inner Cover (see Inner Cover Removal in the Frame chapter)
- Disconnect:
  Left Grip Warmer Lead Connector [A]

- Free the grip warmer lead [A] from the clamps [B].

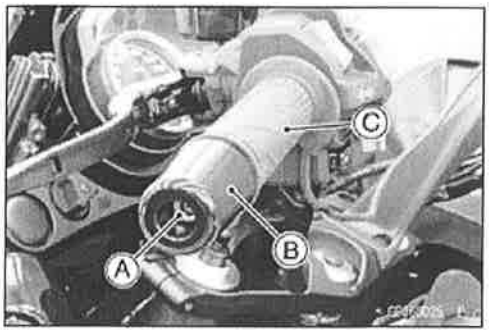


- Free the grip warmer lead [A] from the clamps [B].



- Remove:
  Weight Bolt [A]
  Weight [B]
  Left Grip Warmer Assembly [C]

○The left grip is installed by the adhesive at flange side (Refer to the Left Side section in the Grip Warmer Installation).



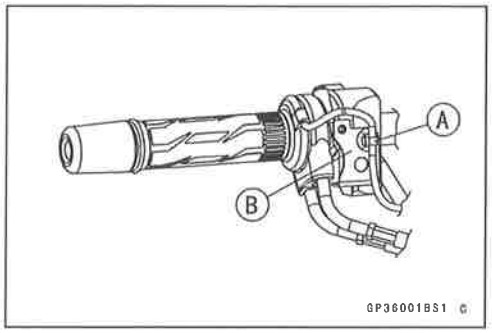
Grip Warmer Installation

Right Side

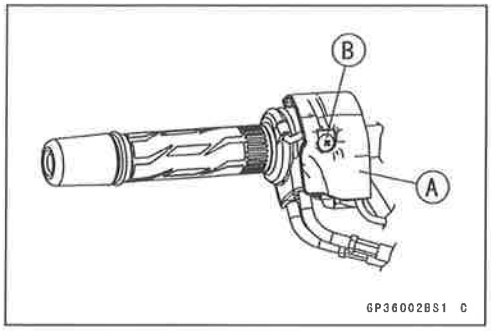
- Install:
  Right Grip Warmer Assembly and Throttle Cable Upper Ends
  Weight
- Apply a non-permanent locking agent to the weight bolt and tighten it.

Grip Warmer

- Insert the clamp [A] in the bracket [B].



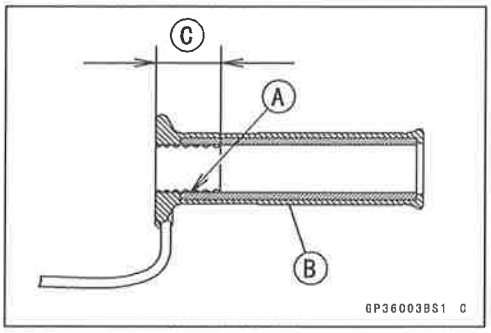
- Install:
  Cover [A]
  Screw [B]
- Run the grip warmer lead correctly (see Cable, Wire, and Hose Routing Section in the Appendix chapter).
- Connect the right grip warmer lead connector.
- Install:
  Right Inner Cover (see Inner Cover Installation in the Frame chapter)



Left Side

- Apply adhesive [A] to the left grip [B] as shown.
  30 mm (1.2 in.) or more [C]

  Sealant - Adhesive, TB1530C: 56042-0001

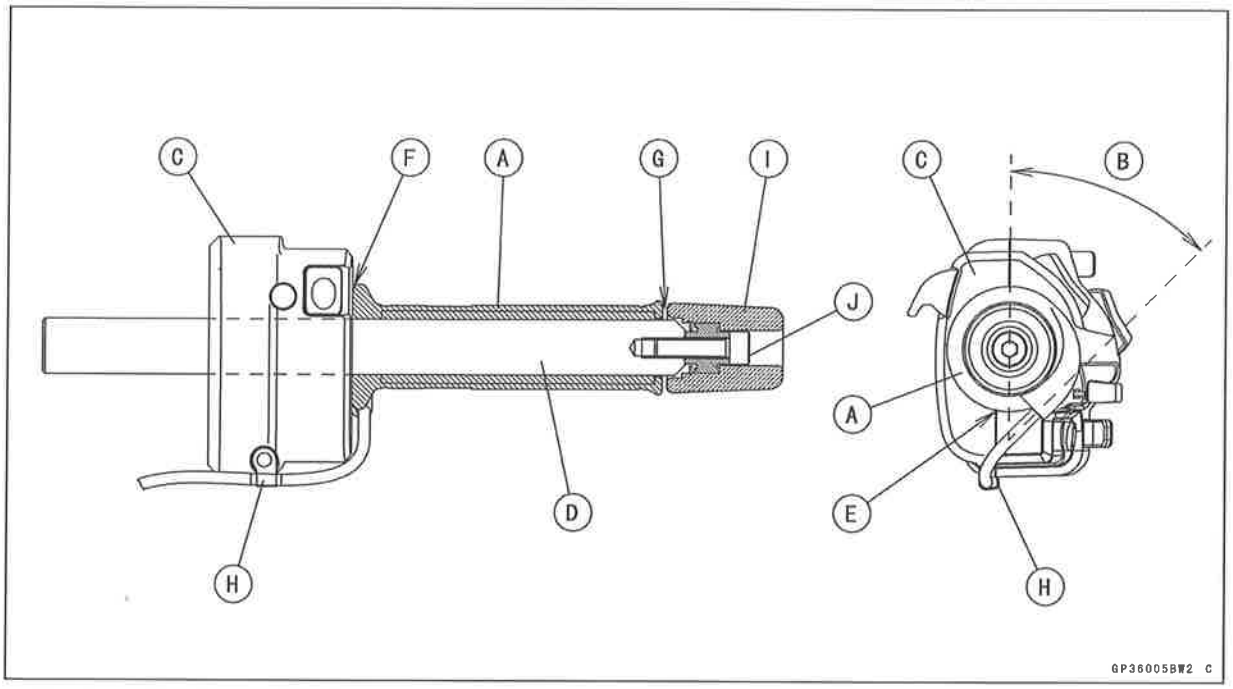


Grip Warmer

- Install the left grip warmer assembly [A] as shown.
  45° [B]
  Left Handlebar Switch Housing [C]
  Left Handle Bar [D]

○Align the projection of the grip with the mating surface of the left handlebar switch housing [E].
○Touch the left grip to the left handlebar switch housing [F].
○Wipe off any excessive adhesive [G].

- Install:
  Clamp [H]
  Weight [I]
- Apply a non-permanent locking agent to the weight bolt [J] and tighten it.



- Run the grip warmer lead correctly (see Cable, Wire, and Hose Routing Section in the Appendix chapter).
- Connect the left grip warmer lead connector.
- Install:
  Left Inner Cover (see Inner Cover Installation in the Frame chapter)

Grip Warmer Inspection

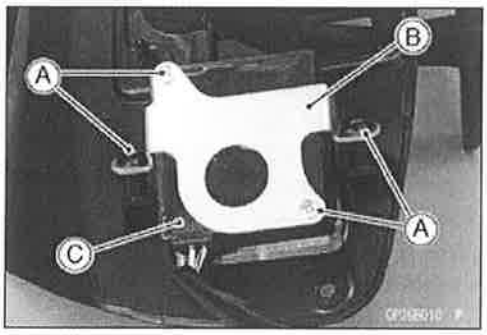
- Disconnect the grip warmer lead connector (see Grip Warmer Removal).
- Connect a tester to the grip warmer lead connector.

Grip Warmer Resistance
Right Grip Warmer: **About 1.13 ~ 1.39 Ω**
Left Grip Warmer: **About 1.65 ~ 2.01 Ω**

★If the tester readings are different much more than the specified, replace the grip warmer assembly.

Grip Warmer

Grip Warmer Temperature Adjustment Dial Removal



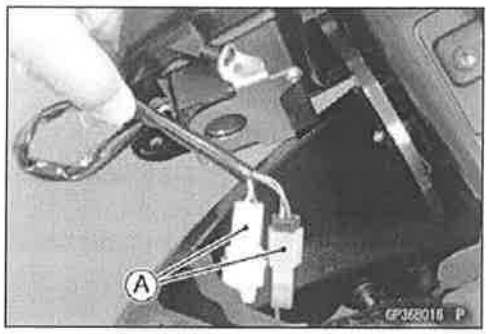
- Remove:
  Left Inner Cover (see Inner Cover Removal in the Frame chapter)
  Grip Warmer Temperature Adjustment Dial Screws [A]
  Bracket [B]
  Grip Warmer Temperature Adjustment Dial [C]

Grip Warmer Temperature Adjustment Dial Installation

- Installation is the reverse of removal.
- Tighten:

Torque - Grip Warmer Temperature Adjustment Dial Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)

Grip Warmer Temperature Adjustment Dial Inspection

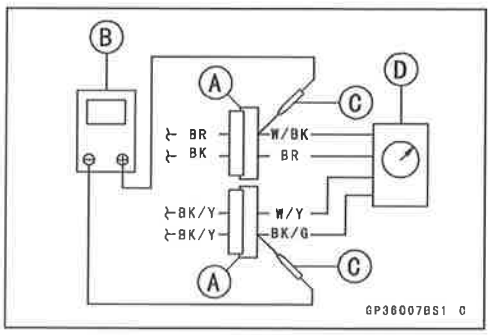


- Remove the left inner cover (see Inner Cover Removal in the Frame chapter).

○Need not to disconnect the grip warmer temperature adjustment dial lead connectors [A].

- Connect a tester [B] to the grip warmer temperature adjustment dial lead connectors using the needle adapter set [C] as shown.
  Grip Warmer Temperature Adjustment Dial [D]

Special Tool - Needle Adapter Set: 57001-1457



Connections:
Tester (+) → W/BK Lead
Tester (–) → BK/G Lead

- Turn the key knob to "ON" and measure the output voltage with the following dial positions.

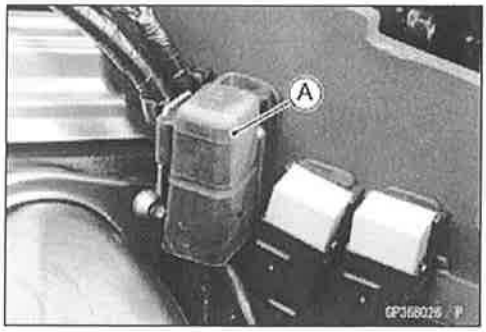
Output Voltage

Dial Position	Voltage
OFF	about Battery Voltage
LO	6 ~ 12 V
HI	Less than 2 V

★If the tester readings are not as specified, check the following items.
  Grip Warmers (see Grip Warmer Inspection)
  Grip Warmer Relay (see Grip Warmer Relay Inspection)
  Wiring Continuity (see wiring diagram in this section)
★If above items are good, replace the grip warmer temperature adjustment dial.

Grip Warmer

Grip Warmer Relay Inspection



- Remove:
  Left Inner Cover (see Inner Cover Removal in the Frame chapter)
- Refer to the Headlight Relay Inspection for grip warmer relay inspection.

○The grip warmer relay [A] is identical with the headlight relays.

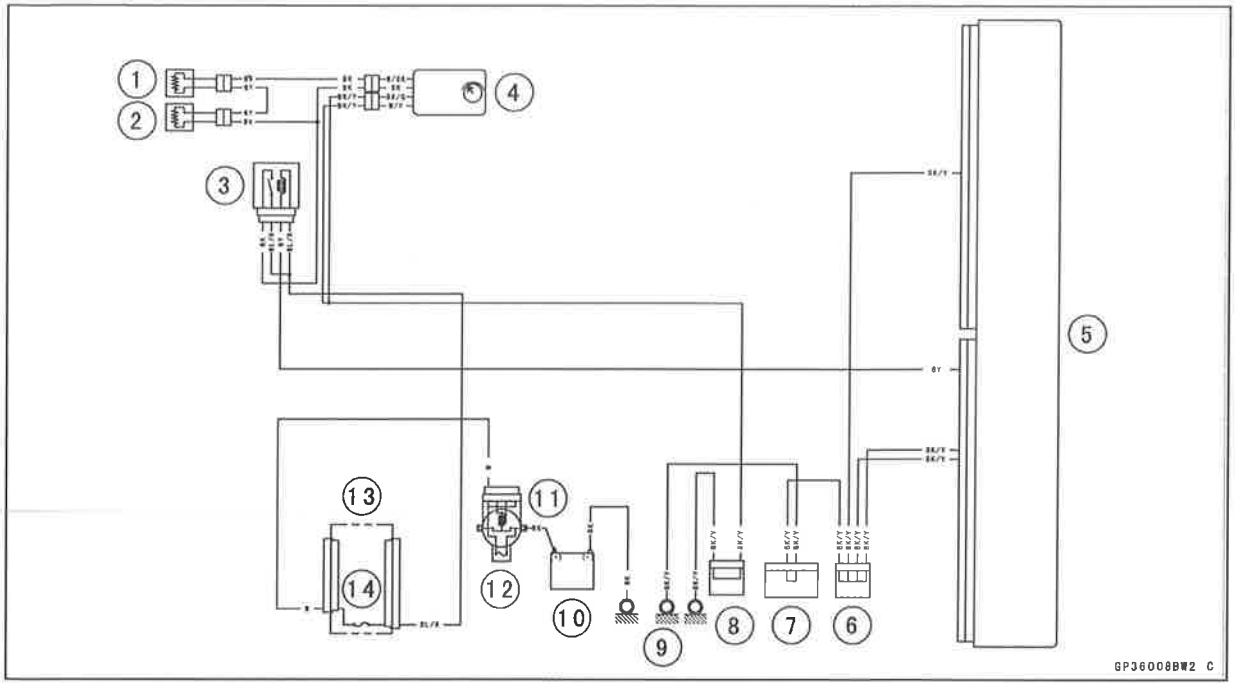
Grip Warmer System Inspection

- Check the following items when the grip warmer doesn't become hot though engine starts.
  Battery (see Charging Condition Inspection)
  Grip Warmer Fuse 10 A (see Fuse Inspection)
  Grip Warmer (see Grip Warmer Inspection)
  Grip Warmer Temperature Adjustment Dial (see Grip Warmer Temperature Adjustment Dial Inspection)
  Grip Warmer Relay (see Grip Warmer Relay Inspection)
  Wiring Continuity (see wiring diagram in this section)

★If the all parts are good, replace the ECU.

Grip Warmer

Grip Warmer System Circuit

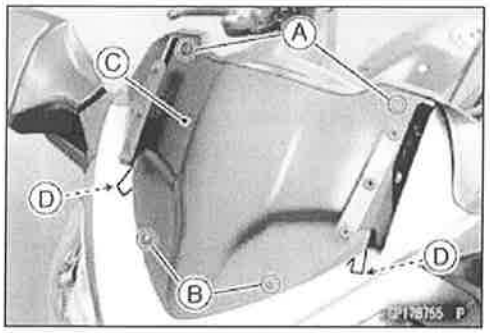


1. Right Grip Warmer
2. Left Grip Warmer
3. Grip Warmer Relay
4. Grip Warmer Temperature Adjustment Dial
5. ECU
6. Joint Connector 3
7. Joint Connector 9
8. Joint Connector 10
9. Frame Ground
10. Battery 12 V 14 Ah
11. Starter Relay
12. Main Fuse 30 A
13. Fuse Box 3
14. Grip Warmer Fuse 10 A

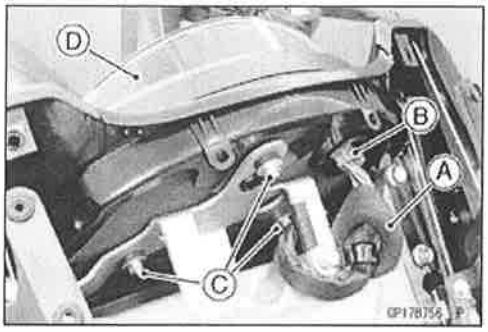
Meter, Gauge, Indicator Unit

Meter Unit Removal

- Remove:
  Windshield (see Windshield Removal in the Frame chapter)
  Quick Rivets [A]
  Electric Windshield Actuator Cover Bolts [B]
- Clear the upper edge of the electric windshield assembly cover [C].
- Slide the electric windshield assembly cover upward to clear the hooks [D].



- Slide the rubber cover [A] and disconnect the meter lead connector [B].
- Remove:
  Meter Unit Mounting Nuts [C] and Washers
  Meter Unit [D]
  Damper

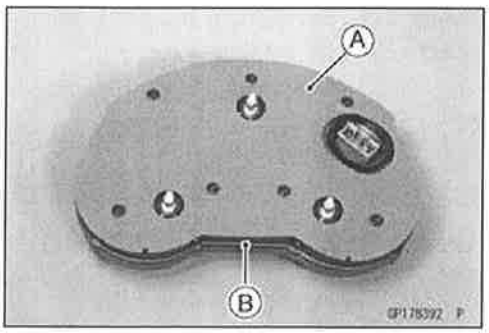


NOTICE

Place the meter unit so that the face is up. If a meter unit is left upside down or sideways for any length of time, it will malfunction.

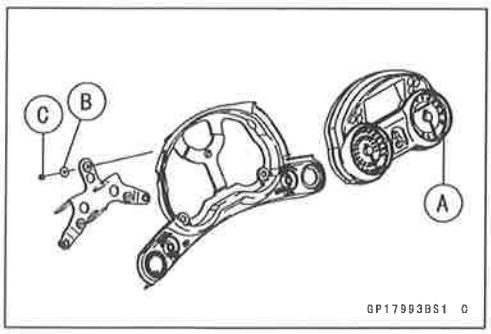
Meter Unit Installation

- Fit the holes of the damper [A] onto the projections of the meter unit [B].



- Install:
  Meter Unit [A]
  Washers [B]
- Tighten:

Torque - Meter Unit Mounting Nuts [C]: 4.0 N·m (0.41 kgf·m, 35 in·lb)



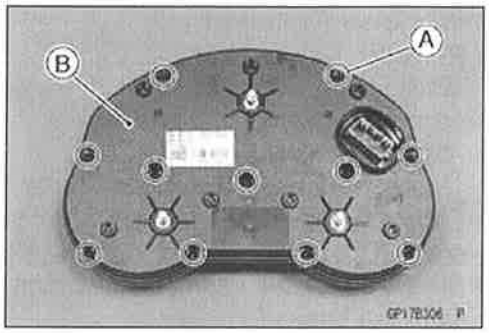
- Install the removed parts (see appropriate chapters).
- Tighten:

Torque - Electric Windshield Actuator Cover Bolts: 3.0 N·m (0.31 kgf·m, 27 in·lb)

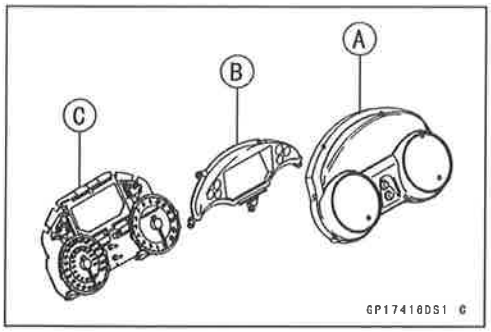
Meter, Gauge, Indicator Unit

Meter Unit Disassembly

- Remove:
  Meter Unit (see Meter Unit Removal)
  Screws [A]
  Lower Meter Cover [B]



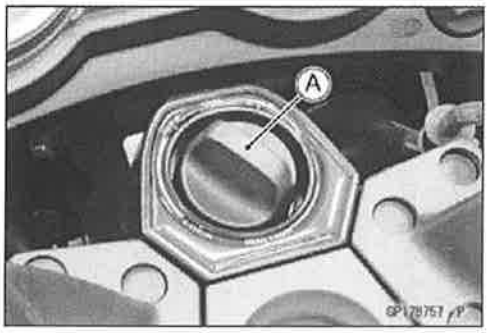
- Separate:
  Upper Meter Cover [A]
  Middle Meter Cover [B]
  Meter Assembly [C]



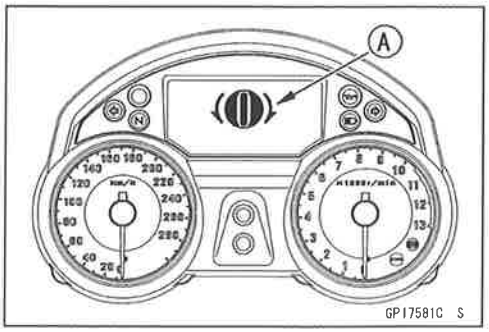
Meter Operation Inspection

Check 1-1: Switching Inspection

- Push the key knob [A].

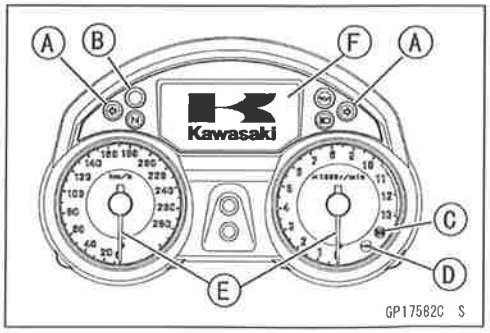


- Check that the key knob indicator [A] appears in the display for 5 seconds.



- Turn the key knob to "ON" while the key knob symbol appears.
- Check the following items.

○The green turn signal indicator lights (LED) [A] blink 2 times.
○The red warning indicator light (LED) [B] goes on for 3 seconds.
○The yellow K-ACT ABS indicator light (LED) [C] goes on.
○The yellow KTRC indicator light (LED) [D] blinks.
○The speedometer and tachometer needles [E] momentarily point their last readings and back to the minimum position.
○The Kawasaki logo [F] appears in the display for three seconds.

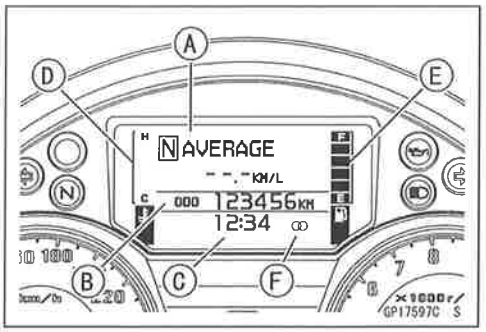


Meter, Gauge, Indicator Unit

○After the Kawasaki logo appeared, the ordinary indication [A] (Example: N, AVERAGE --.- KM/L), odometer [B] or trip meter, clock [C], water temperature gauge [D], fuel level gauge [E], and K-ACT ABS indicator [F] appear in the display.

★If the meter does not work and the KIPASS is good, replace the meter unit.

● Refer to the Meter Unit Inspection for other indicator lights (LED) inspection.

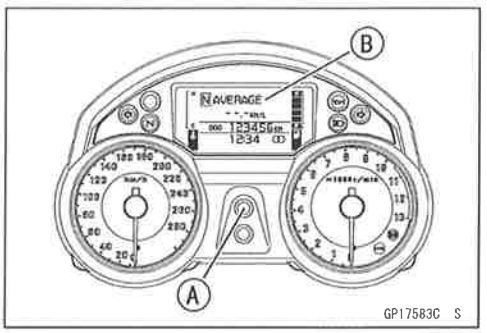


● By pushing the upper meter button [A] each time, check that the display [B] changes as follows.

○This display is ordinary indication.

AVERAGE → CURRENT → RANGE → TIRE F → BATTERY
TIRE R
OUTSIDE

GP17566CN3 C

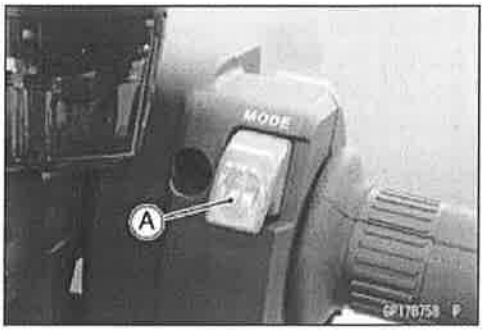


● By pushing the meter mode button [A] at front side of the left handlebar switch housing each time, check that the display changes as shown in the above figure.

★If the display function does not work, replace the meter unit.

★If the display function does not work when using the meter mode button, check the following parts.

Meter Mode Button (see Meter Unit Circuit)
Wiring (see Meter Unit Circuit)

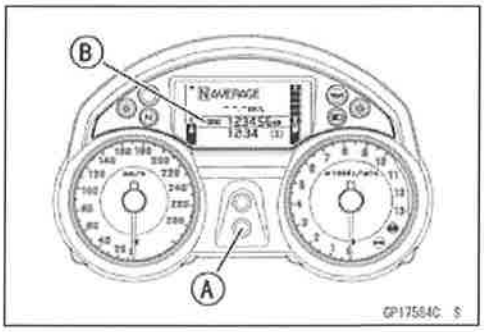


● By pushing the lower meter button [A] each time, check that the display [B] changes as follows.

○This display is ordinary indication, also.

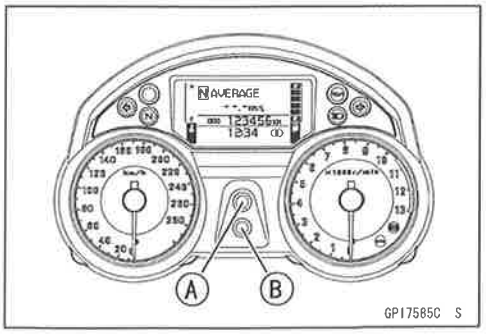
ODO → TRIP A → TRIP B

GP17015CN3 C



★If the display function does not work, replace the meter unit.

● While the ordinary indication, push the upper meter button [A] and lower meter button [B] for more than 2 seconds.



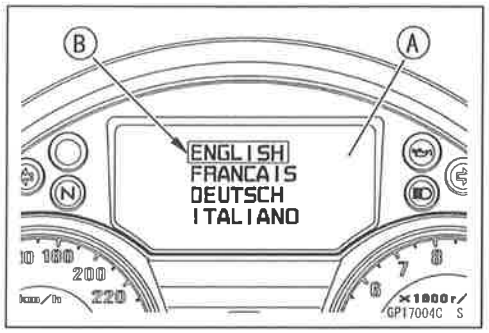
Meter, Gauge, Indicator Unit

- Check that the display changes to the language setting mode [A].

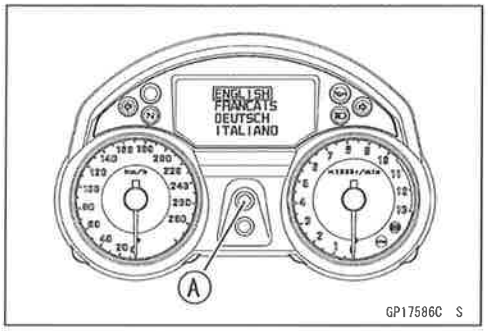
○This display is system menu indication.

- By pushing the lower meter button each time, check that the cursor [B] changes on the languages.

★If the display function does not work, replace the meter unit.



- While the language setting mode, push the upper meter button [A].



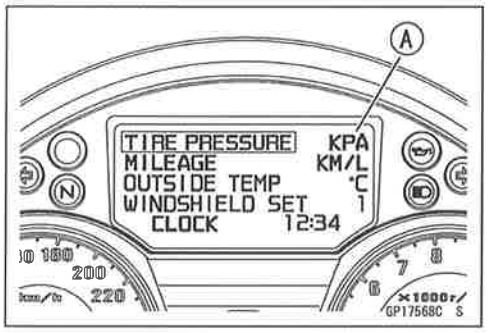
- Check that the display [A] changes to the TIRE PRESSURE, MILEAGE, OUTSIDE TEMP, WINDSHIELD SET and CLOCK modes.

○This display is system menu indication, also.

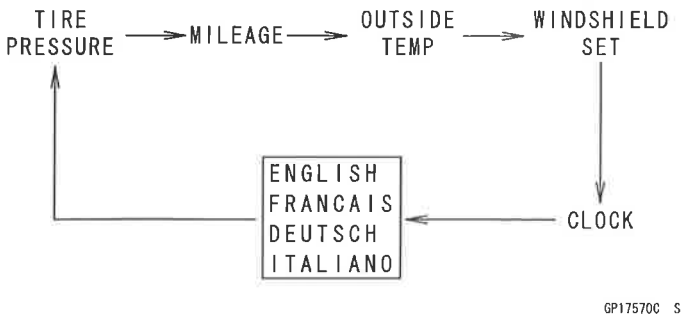
NOTE

○*When the battery is installed, the TIRE PRESSURE is not displayed at once.*

○*If the TIRE PRESSURE is not displayed, wait for about 3 minutes after the key knob is turned to "ON."*



- By pushing the upper meter button each time, check that the display changes as follows.

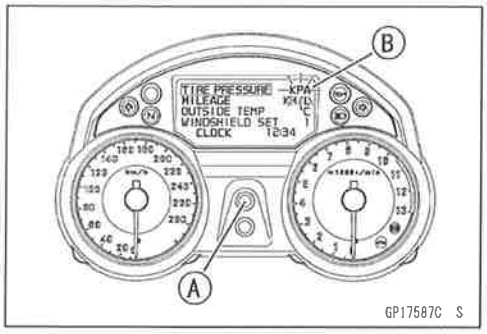


★If the display function does not work, replace the meter unit.

Meter, Gauge, Indicator Unit

- When the TIRE PRESSURE is indicated, push the upper meter button [A] for more than 2 seconds.
- Check that the unit [B] blinks.
- By pushing the lower meter button each time, check that the display changes as follows.

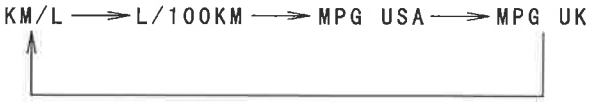
GP17016CN3 C



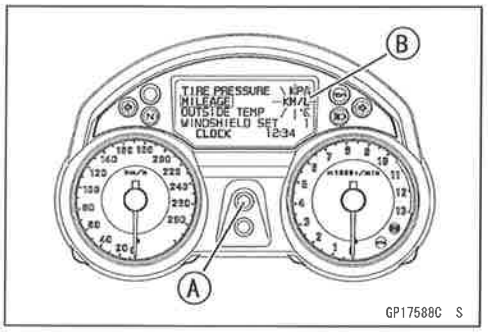
- Check that the unit setting menu is decided by the upper meter button pushing.

★If the display function does not work, replace the meter unit.

- Select the MILEAGE indication.
- Push the upper meter button [A] for more than 2 seconds.
- Check that the unit [B] blinks.
- By pushing the lower meter button each time, check that the display changes as follows.



GP17017CN3 C

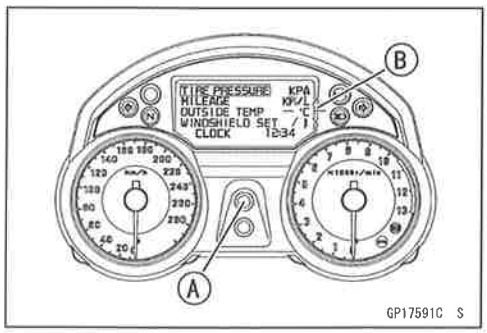


- Check that the unit setting menu is decided by the upper meter button pushing.

★If the display function does not work, replace the meter unit.

- Select the OUTSIDE TEMP indication.
- Push the upper meter button [A] for more than 2 seconds.
- Check that the unit [B] blinks.
- By pushing the lower meter button each time, check that the display changes as follows.

GP17589CN3 C



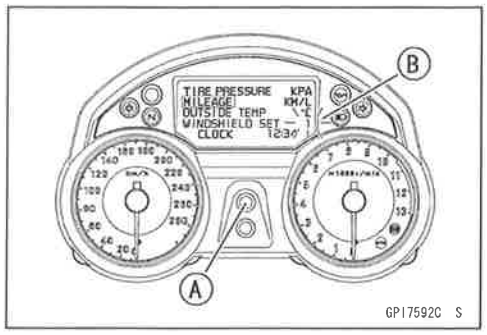
- Check that the unit setting menu is decided by the upper meter button pushing.

★If the display function does not work, replace the meter unit.

Meter, Gauge, Indicator Unit

- Select the WINDSHIELD SET indication.
- Push the upper meter button [A] for more than 2 seconds.
- Check that the figure [B] blinks.
- By pushing the lower meter button each time, check that the display changes as follows.

GP17590GN3 C

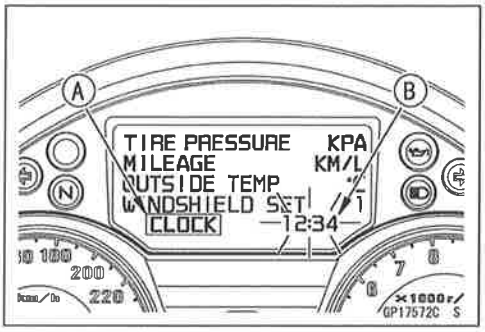


- Check that the figure setting menu is decided by the upper meter button pushing.

★If the display function does not work, replace the meter unit.

- Select the CLOCK [A] is indication.
- Push the upper meter button for more than 2 seconds.

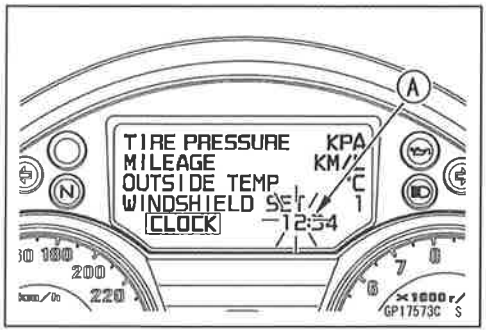
○The clock setting menu (hour and minute) [B] should blink.



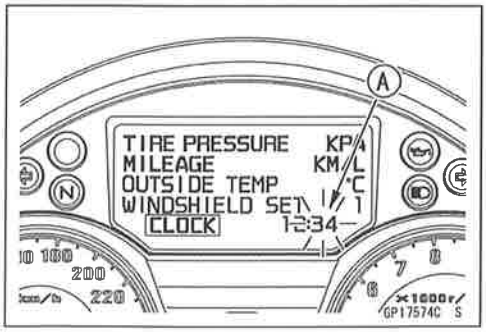
- Push the lower meter button.

○The hour display [A] starts blinking.

- By pushing the upper meter button each time, check that the hour display changes.



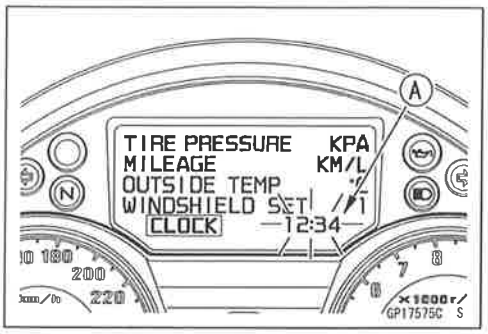
- By pushing the lower meter button, check that the hour display is decided and minute display [A] starts blinking.
- By pushing the upper meter button each time, check that the minute display changes.



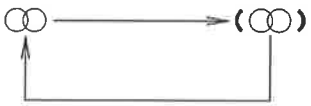
Meter, Gauge, Indicator Unit

- By pushing the lower meter button, check that the hour and minute display [A] starts blinking.
- By pushing the upper meter button, check that the hour and minute display is decided.
- When both hour and minute display blinking, by pushing the lower meter button, check that the hour display start blinking. This blinking returns hour setting mode.

★If the display function does not work, replace the meter unit.



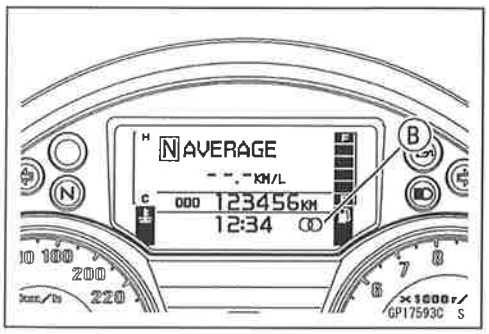
- By pushing the K-ACT button [A] at the left handlebar switch housing for 2 seconds each time, check that the K-ACT ABS indicator [B] changes as follows.



GP17595CN3 C

★If the display function does not work, check the following parts.
K-ACT Button (see Meter Unit Circuit)
Wiring (see Meter Unit Circuit)

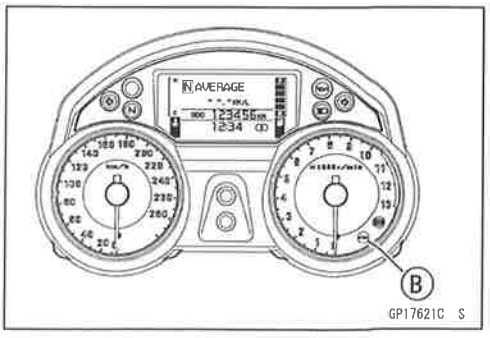
★If the above parts is good, replace the meter unit and/or K-ACT ABS hydraulic unit.



- By pushing the KTRC button [A] at the left handlebar switch housing for 2 seconds each time, check that the yellow KTRC indicator light (LED) [B] changes to going on or blinking.

★If the indicator light (LED) does not work, check the following parts.
KTRC Button (see Meter Unit Circuit)
Wiring (see Meter Unit Circuit)

★If the above parts is good, replace the meter unit and/or ECU.

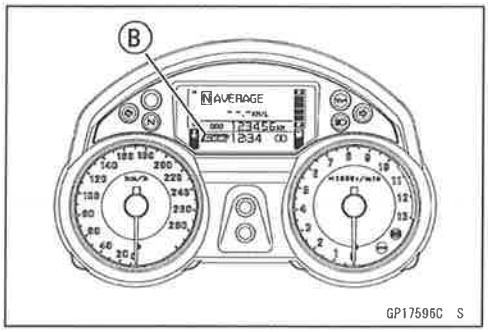


Meter, Gauge, Indicator Unit

- By pushing the meter mode button [A] at front side of the left handlebar switch housing for 2 seconds each time, check that the fuel economy assistance indicator [B] changes to appearing or disappearing.

★If the display function does not work, check the following parts.
Meter Mode Button (see Meter Unit Circuit)
Wiring (see Meter Unit Circuit)

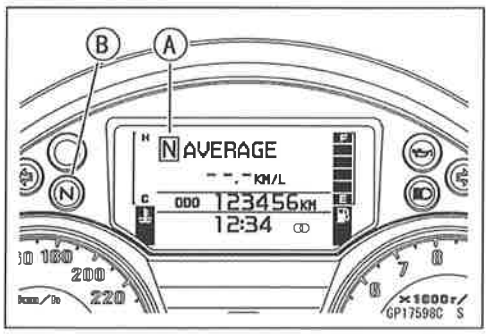
★If the above parts is good, replace the meter unit and/or ECU.



Check 1-2: Gear Position Indication Inspection

- Push and turn the key knob to "ON."

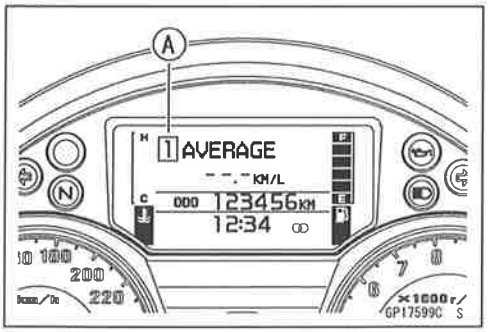
○The "N" mark [A] appears in the display and the green neutral indicator light (LED) [B] goes on when the neutral position.



- Shift the transmission into the low gear, and check that the display changes to "1" mark [A] and the green neutral indicator light (LED) goes off.
- Using the center stand, raise the rear wheel off the ground.
- Rotate the rear wheel by hand or start the engine, and change the gear position.
- Check that the display corresponding to each gear position (1, 2, 3, 4, 5 or OD) appears.

★If the display function does not work, check the following parts.
Gear Position Switch (see Gear Position Switch Inspection)
Wiring (see Meter Unit Circuit)

★If the above parts is good, replace the meter unit and/or ECU.

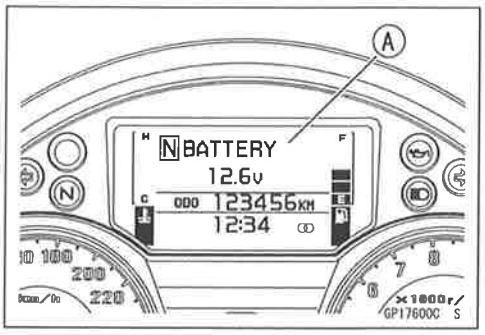


Meter, Gauge, Indicator Unit

Check 1-3: Battery Voltage Inspection

- Select the battery voltage indication [A] in the ordinary indication.

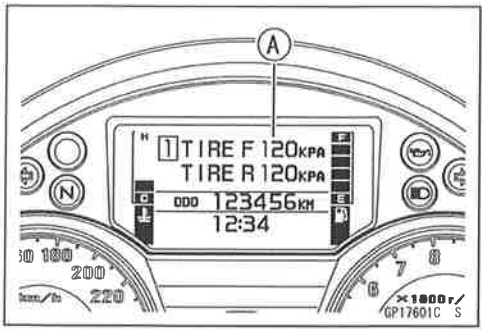
○The voltage corresponding to a present battery condition is displayed.
○The voltage range is 9.0 ~ 16 V.
○The tolerance is ±0.4 V.
★If the display is malfunction, check the wiring (see Meter Unit Circuit).
★If the wiring is good, replace the meter unit.



Check 1-4: Tire Air Pressure Inspection

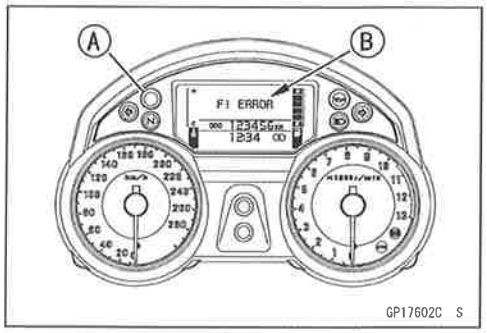
- Select the tire air pressure indication [A] in the ordinary indication.

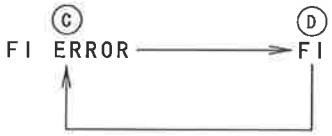
○The tire air pressure is displayed by riding as approx 20 km/h or more and 1 minute passed.
○The display range is 0 ~ 350 kPa (50 psi).
★If the display is malfunction without the warning message or service code, check the wiring (see wiring diagram in this section).
★If the wiring is good, replace the meter unit and/or KIPASS ECU.



Check 1-5: Warning Message Inspection

- For example, disconnect the atmospheric pressure sensor connector under the seat.
- Push and turn the key knob to "ON."
- Check that the red warning indicator light (LED) [A] goes on and the display [B] changes as follows.





GP17018CN3 C

[C] Warning Message
[D] Warning Indicator

○The display is the warning message indication.
★If the display function does not work, go to the Check 3-1 and check the following items.
Wiring (see Wiring Inspection)
CAN Communication Line Resistance (see CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter)
★If the above items are good, replace the meter unit and/or ECU.

Meter, Gauge, Indicator Unit

- Push the upper and lower meter buttons for more than 2 seconds, check that the "ERROR CODE" [A] and numbers appear in the display.

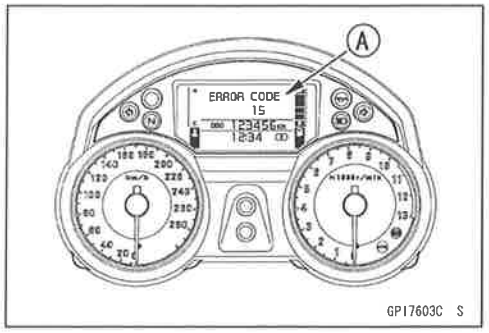
○The red warning indicator light (LED) goes on.

- Again, push the upper and lower meter buttons for more than 2 seconds, check that the display returns the warning message indication.

○The red warning indicator light (LED) goes on.

- Connect the atmospheric pressure sensor connector and then the warning message and red warning indicator light (LED) go off.

★If the display function does not work, replace the meter unit.



Meter System Inspection

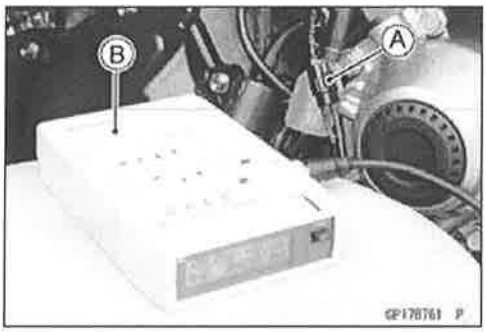
Check 2-1: Speedometer Inspection

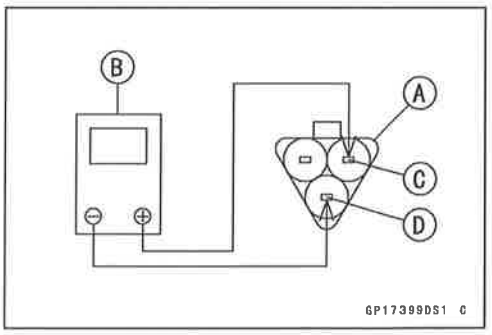
- Disconnect the speed sensor lead connector [A].
- Connect a suitable oscillator [B] to the main harness connector as shown.
- The speed equivalent to the input frequency is indicated in the oscillator, if the square wave is input into BL/Y lead terminal [C].

  BK/Y Lead Terminal [D]
- Push and turn the key knob to "ON."
- Indicates approximately 60 mph if the input frequency is approximately 616 Hz.
- Indicates approximately 60 km/h if the input frequency is approximately 385 Hz.

★If the meter function does not work, check the wiring (see Meter Unit Circuit).

★If the wiring is good, replace the meter unit.





NOTE

○*The input frequency of the oscillator adds the integrated value of the odometer.*

○*The integrated value of the odometer cannot be reset.*

Check 2-2: Odometer Inspection

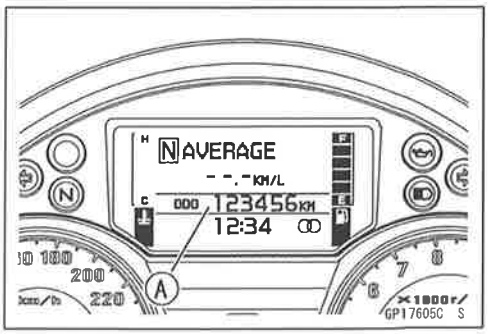
- Connect the leads in the same circuit as Check 2-1.
- Push and turn the key knob to "ON."
- Raise the input frequency of the oscillator to see the result of odometer [A] inspection.

○Example: Indicates the increase of approximately 1 mile, if the input frequency is approximately 616 Hz for one minute.

○Example: Indicates the increase of approximately 1 km, if the input frequency is approximately 385 Hz for one minute.

★If the value indicated by the odometer does not increase, check the wiring (see wiring diagram in this section).

★If the wiring is good, replace the meter unit.

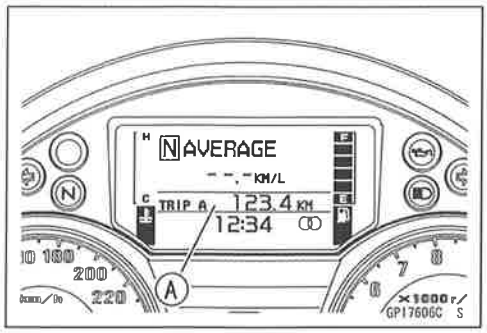


NOTE

○*The integrated value of the odometer cannot be reset.*

Meter, Gauge, Indicator Unit

Check 2-3: Trip A/B Meter Inspection



- Connect the leads in the same circuit as Check 2-1.
- Push and turn the key knob to "ON."
- Set the TRIP A or B meter mode [A] in the display.
- Raise the input frequency of the oscillator to see the result of this inspection.

★If the value indicated by the trip meter A/B do not increase, replace the meter assembly.

- Push the lower meter button for more than 2 seconds and check that each TRIP meter resets to "0.0."

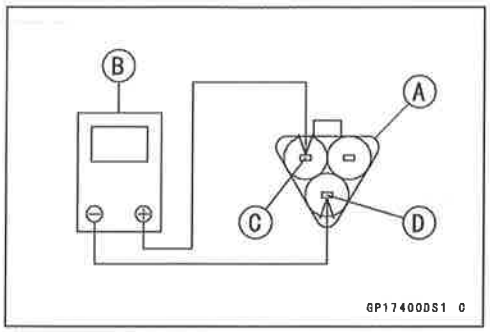
★If the display function does not change, check the wiring (see Meter Unit Circuit).

★If the wiring is good, replace the meter unit.

NOTE

○*The integrated value of the odometer cannot be reset.*

Check 2-4: Speed Sensor Supply Voltage Inspection



- Disconnect the speed sensor lead connector [A].
- Connect a tester [B] to the main harness as shown.

Connections:
Tester (+) → P Lead Terminal [C]
Tester (–) → BK/Y Lead Terminal [D]

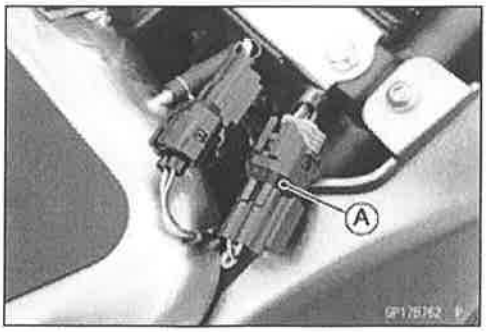
- Push and turn the key knob to "ON," and measure the voltage.

Speed Sensor Supply Voltage
Standard: About 12 V

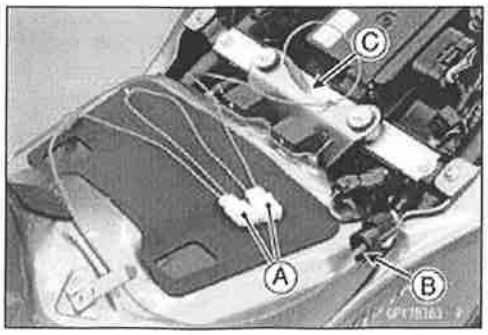
★If the tester reading is not specified, check the wiring (see Meter Unit Circuit).

★If the wiring is good, replace the meter unit.

Check 2-5: Fuel Level Warning Inspection



- Remove:
  Seat (see Seat Removal in the Frame chapter)
- Disconnect the fuel pump lead connector [A].



- Connect the resistor(s) [A] (about 22 Ω) to the LG/BK lead terminal [B] of the main harness and the ground [C].

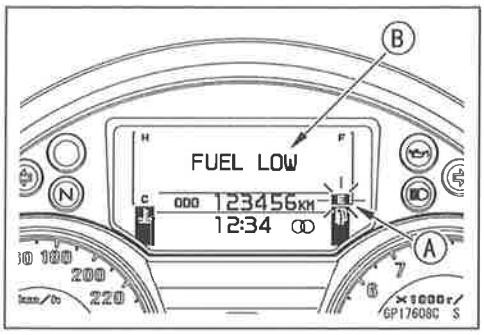
Meter, Gauge, Indicator Unit

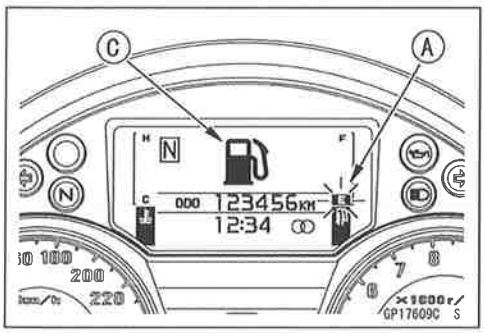
- Push and turn the knob key to "ON."
- After about 5 seconds, check that one segment [A] in the fuel gauge starts blinking.
- Check that the "FUEL LOW" [B] and fuel symbol [C] appear alternately in the display.

○This display is the warning message indication.

★If the display function does not change, check the wiring (see Meter Unit Circuit).

★If the wiring is good, replace the meter unit.

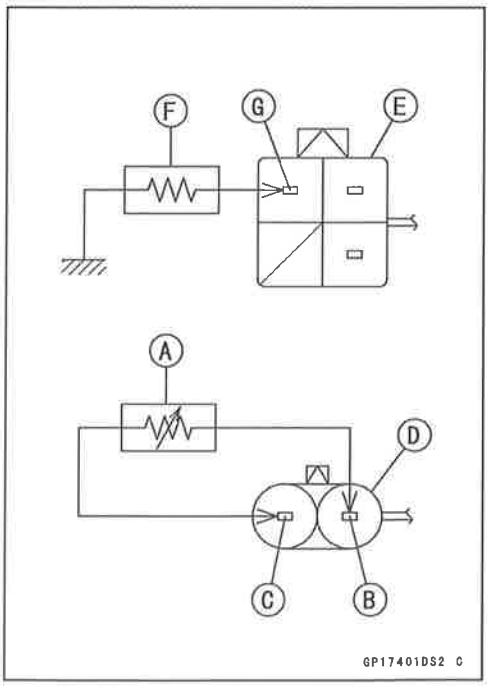




Check 2-6: Fuel Level Gauge Inspection

- Connect the leads in the same circuit as Check 2-5, but change the resistor (about 22 Ω) to the (about 1 kΩ).
- Take out the fuel level gauge lead connector and disconnect it.
- Connect the variable rheostat [A] to the W/Y lead terminal [B] and BK/Y lead terminal [C] of the main harness.

[D] Fuel Level Gauge Lead Connector
[E] Fuel Pump Lead Connector
[F] Resistor (about 1 kΩ)
[G] LG/BK Lead Terminal



Meter, Gauge, Indicator Unit

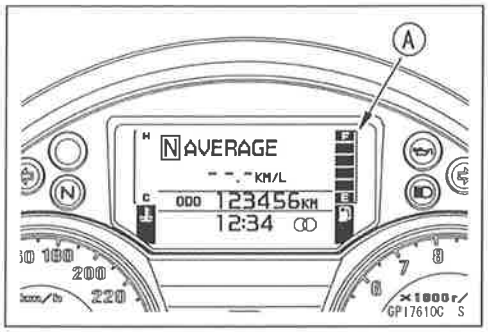
- Push and turn the key knob to "ON."
- Check that the number of segments matches the resistance value of the variable rheostat.

○The one segment in the fuel level gauge should appear about every 15 seconds.

Variable Rheostat Resistance	Display Segments [A]
10 Ω	6
200 Ω or more	1

★If the display function does not change, check the wiring (see Meter Unit Circuit).

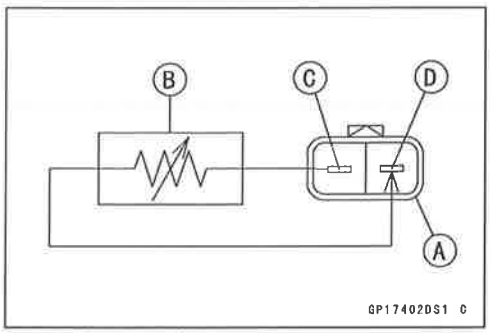
★If the wiring is good, replace the meter unit.



Check 2-7: Outside Temperature Inspection

- Disconnect the outside temperature sensor lead connector [A] (see Outside Temperature Sensor Removal).
- Connect the variable rheostat [B] to the BK lead [C] and BK/Y lead [D] terminals.

	Resistance		
	9.5660 kΩ	2.5580 kΩ	0.6097 kΩ
Temperature	–13 ±2°C	17 ±2°C	57 ±2°C
	9 ±4°F	63 ±4°F	135 ±4°F



- Push and turn the key knob to "ON," and read the temperature in the display.

○The display range is –20 ~ 60°C (–4 ~ 140°F).

★If the temperature is out of the range, the indication fixes the minimum value or maximum value.

○When the speed is 20 km/h (12 mph) or less and rising the temperature, the indication fixes the value of just before the indication.

★If the display function does not work, check the wiring (see Meter Unit Circuit).

★If the wiring is good, replace the meter unit.

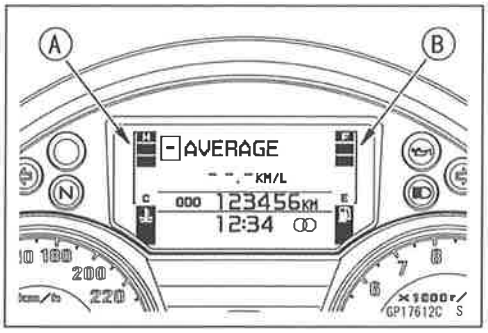
Check 2-8: Other Inspection

- When the water temperature gauge indications is malfunction, even though the warning message does not appear, check the following parts.
  Water Temperature Sensor (see Water Temperature Sensor Inspection)
  Wiring (see Meter Unit Circuit)

★If the above parts is good, replace the meter unit and/or ECU.

Meter, Gauge, Indicator Unit

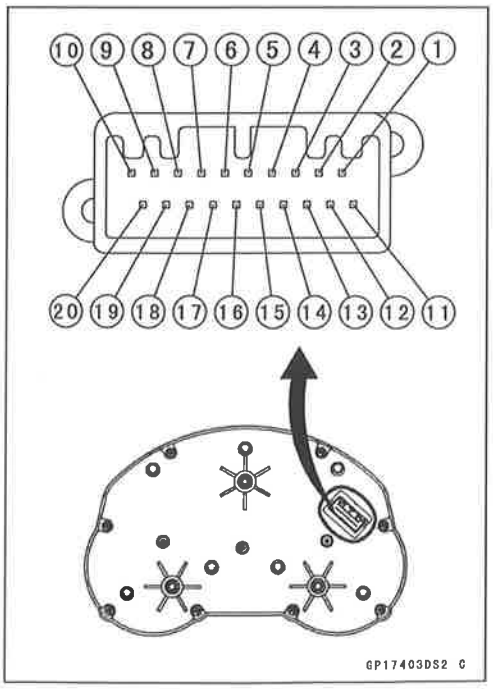
★If the 3 segments of the water temperature gauge [A] is blinked, it is the communication error of the meter and the ECU.
★If the 3 segments of the fuel level gauge [B] is blinked, it is open or short of the fuel reserve switch.
● When the above both blinkings appear, check the following parts.
Wiring (see Meter Unit Circuit)
CAN Communication Line Resistance (see Check 1 and CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter)
Fuel Reserve Switch (for fuel level gauge blinking) (see Fuel Reserve Switch Inspection)
★If the above parts is good, replace the meter unit and/or ECU.



○The following items are displayed while running.
AVERAGE
CURRENT
RANGE
● When the above item is faulty indication, check the following items.
Wiring (see Wiring Inspection)
CAN Communication Line Resistance (see Check 1 and CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter)
Fuel Injectors (see Fuel Injectors Inspection in the Fuel System (DFI) chapter)
Speed Sensor (see Speed Sensor (Service Code 24) section in the Self-Diagnosis System chapter)
Crankshaft Sensor (see Crankshaft Sensor Inspection)
★If the above items are good, replace the meter unit and/or ECU.

Meter Unit Inspection

● Remove the meter unit (see Meter Unit Removal).
[1] Battery (+)
[2] Ignition (+)
[3] KTRC Button
[4] K-ACT ABS Button
[5] Unused
[6] KIPASS ECU
[7] Green Neutral Indicator Light (LED) (–)
[8] Green Right Turn Signal Indicator Light (LED) (+)
[9] Red Oil Pressure Warning Indicator Light (LED) (–)
[10] Blue High Beam Indicator Light (LED) (+)
[11] Meter Mode Button
[12] Green Left Turn Signal Indicator Light (LED) (+)
[13] CAN Communication Line (Low)
[14] CAN Communication Line (High)
[15] Fuel Level Sensor
[16] Fuel Reserve Switch
[17] Outside Temperature Sensor
[18] Speed Sensor Signal
[19] Ground (–)
[20] Speed Sensor Supply Voltage (+)



Meter, Gauge, Indicator Unit

NOTICE

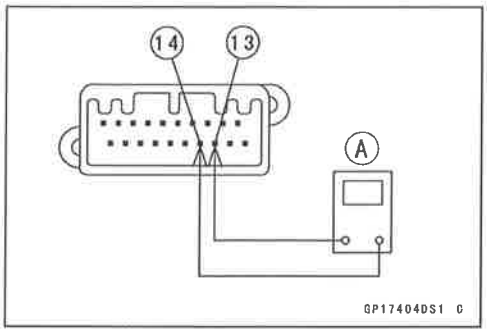
Do not drop the meter unit. Place the meter unit so that it faces upward. If the meter assembly is left upside down or sideways for a long time or dropped, it will malfunction. Do not short each terminals.

Check 3-1: CAN Communication Line Resistance Inspection

- Connect a tester [A] to the terminal [13] and [14] in the meter unit.

CAN Communication Line Resistance (at Meter Unit)
Standard: 123 ~ 125 Ω

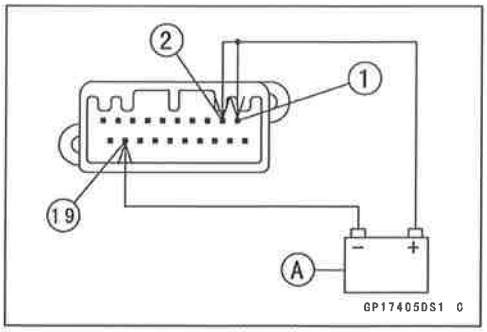
★If the tester reading is not specified, replace the meter unit.



Check 3-2: Meter Unit Power Supply Check

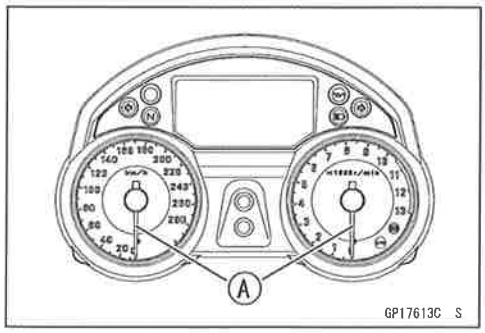
- Using the auxiliary leads, the 12 V battery [A] to the meter unit connector as follows.

○Connect the battery positive (+) terminal to the terminal [1] [2].
○Connect the battery negative (–) terminal to the terminal [19].



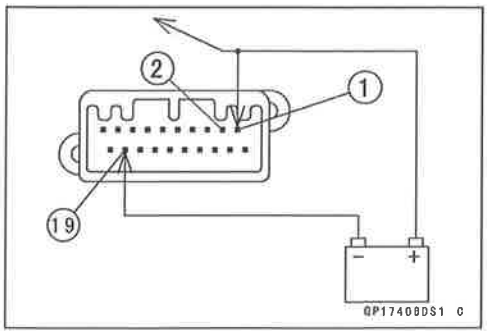
- Check that the speedometer and tachometer needles [A] momentarily point their last readings and back to the minimum position.

★If the meter unit does not work, replace the meter unit.



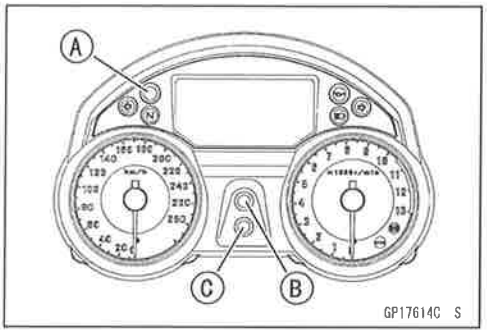
Check 3-3: KIPASS Blinking Mode Inspection

- Connect the leads in the same circuit as Check 3-2.
- Disconnect the terminal [2].



Meter, Gauge, Indicator Unit

- Check that the red warning indicator light (LED) [A] starts blinking (KIPASS Warning Light Blinking Mode).
- Push the upper [B] and lower [C] meter buttons more than 2 seconds, within 20 seconds after the terminal [2] disconnected.
- Check that the red warning indicator light (LED) goes on 1 second, and then the light goes off (KIPASS Warning Light No Blinking Mode).



NOTE

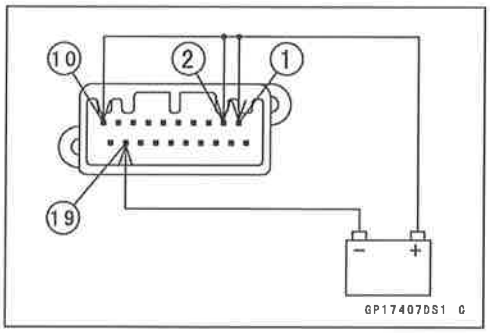
○*For this inspection, be sure the battery is 12.4 V or more. KIPASS Warning Light Blinking Mode does not work when the battery voltage is less than 12±0.4 V.*

- Again, connect the terminal [2] to the battery (+) terminal.
- And then, disconnect the terminal [2].
- Push the upper and lower meter buttons more than 2 seconds, within 20 seconds after the terminal [2] disconnected.
- Check that the red warning indicator light (LED) goes on 1 second, and then the light starts blinking (KIPASS Warning Light Blinking Mode).

★If the meter function does not work, replace the meter unit.

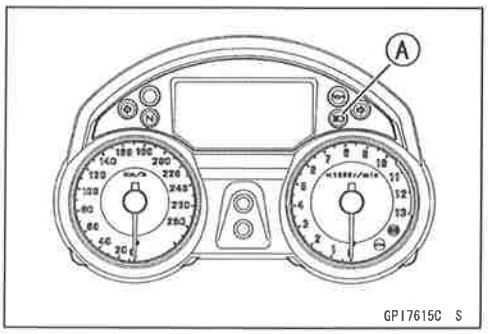
Check 3-4: Blue High Beam Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 3-2.
- Connect the terminal [10] to the battery (+) terminal.



- Check that the blue high beam indicator light (LED) [A] goes on.

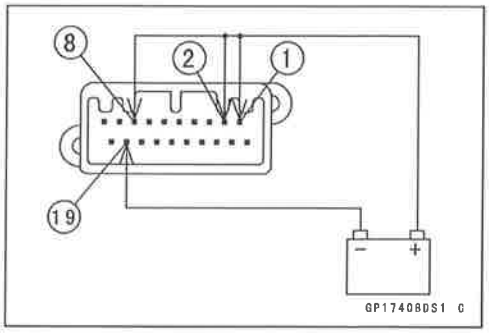
★If the indicator light does not go on, replace the meter unit.



Meter, Gauge, Indicator Unit

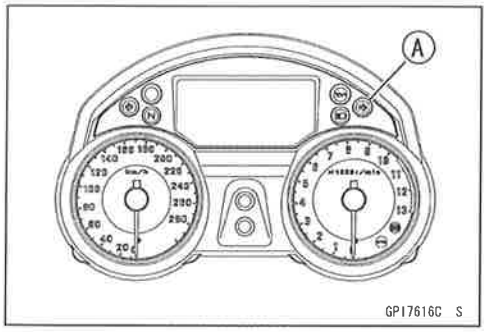
Check 3-5: Green Right Turn Signal Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 3-2.
- Connect the terminal [8] to the battery (+) terminal.



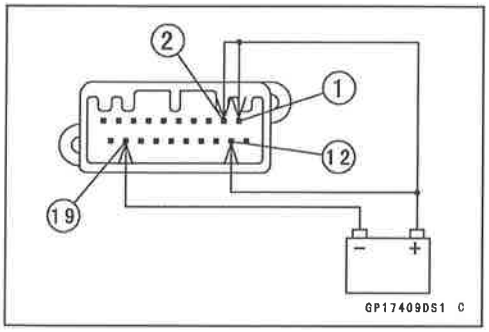
- Check that the green right turn signal indicator light (LED) [A] goes on.

★If the indicator light does not go on, replace the meter unit.



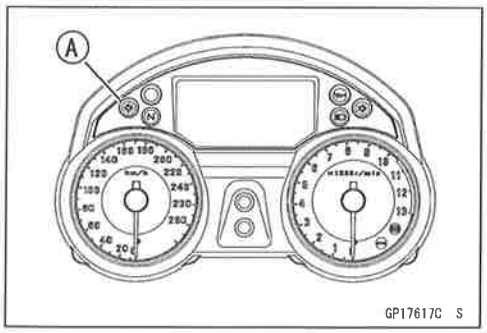
Check 3-6: Green Left Turn Signal Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 3-2.
- Connect the terminal [12] to the battery (+) terminal.



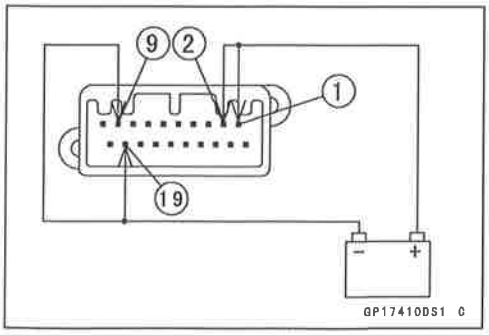
- Check that the green left turn signal indicator light (LED) [A] goes on.

★If the indicator light does not go on, replace the meter unit.



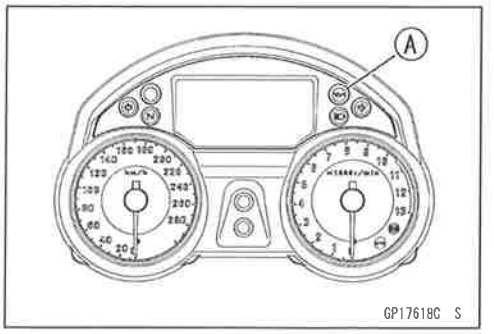
Check 3-7: Red Oil Pressure Warning Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 3-2.
- Connect the terminal [9] to the battery (–) terminal.



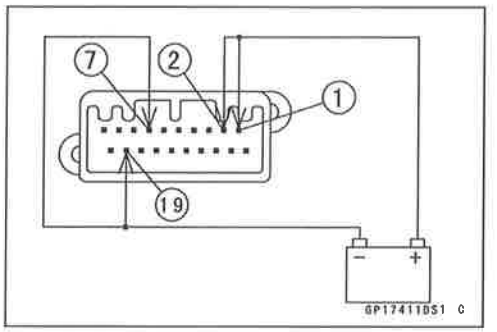
- Check that the red oil pressure warning indicator light (LED) [A] goes on.

★If the indicator light does not go on, replace the meter unit.



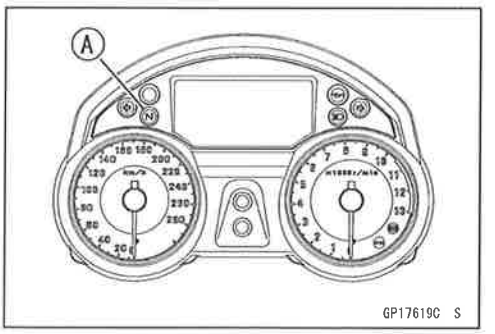
Check 3-8: Green Neutral Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 3-2.
- Connect the terminal [7] to the battery (–) terminal.



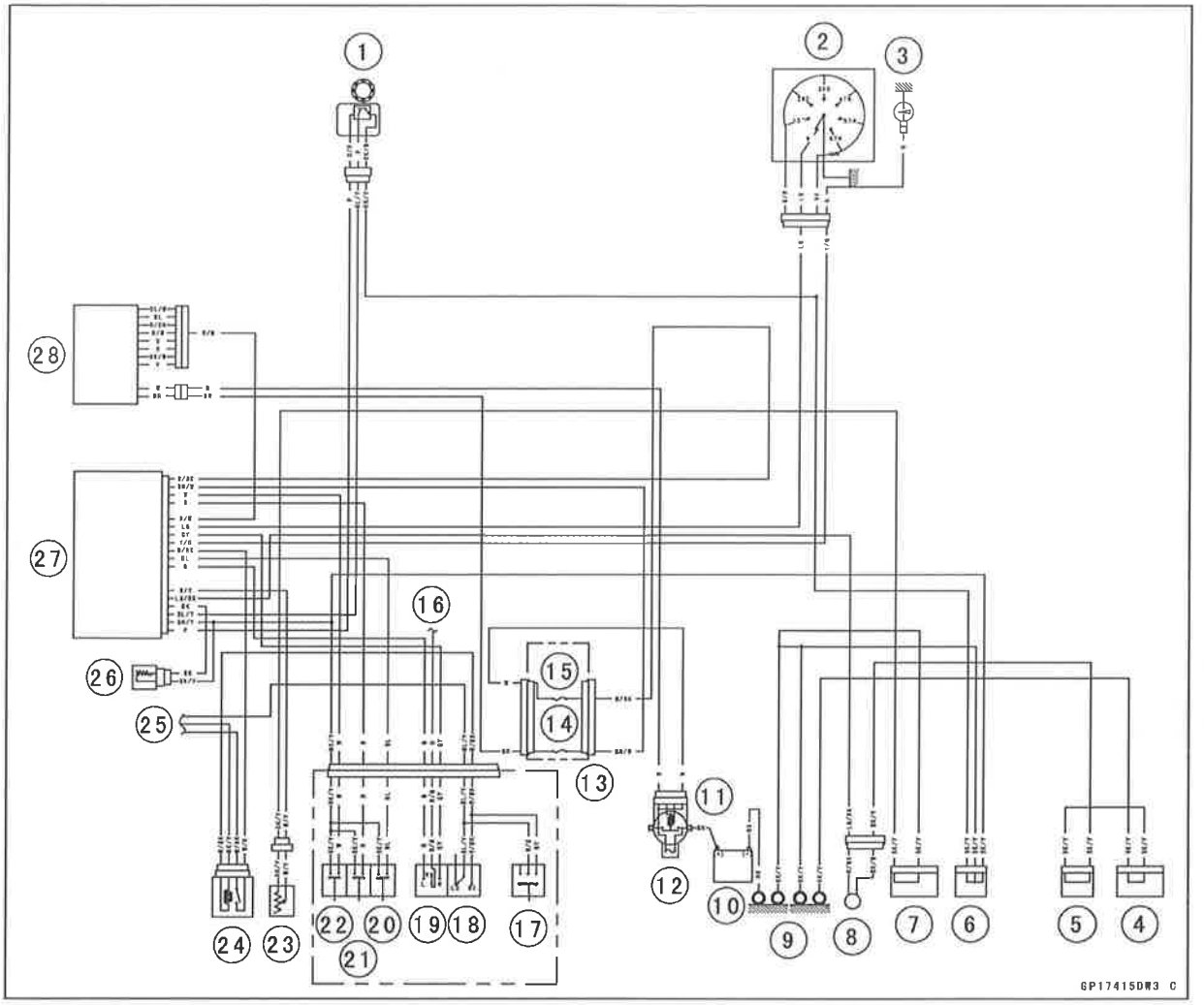
- Check that the green neutral indicator light (LED) [A] goes on.

★If the indicator light does not go on, replace the meter unit.



Meter, Gauge, Indicator Unit

Meter Unit Circuit



1. Speed Sensor
2. Gear Position Switch
3. Oil Pressure Switch
4. Joint Connector 1
5. Joint Connector 2
6. Joint Connector 8
7. Joint Connector 9
8. Fuel Reserve Switch
9. Frame Ground
10. Battery 12 V 14 Ah
11. Starter Relay
12. Main Fuse 30 A
13. Fuse Box 2
14. Ignition Fuse 15 A
15. ECU Fuse 15 A
16. see Turn Signal Light Circuit
17. Passing Button
18. Dimmer Switch
19. Turn Signal Switch
20. Meter Mode Button
21. K-ACT ABS Button
22. KTRC Button
23. Fuel Level Sensor
24. Headlight Relay (High)
25. see Headlight Circuit
26. Outside Temperature Sensor
27. Meter Unit
28. Steering Lock Unit

KIPASS

This motorcycle is equipped with the KIPASS (Kawasaki's Intelligent Proximity Activation Start System) to protect the motorcycle from theft.

⚠ WARNING

KIPASS system may interfere with the operation of certain medical devices such as implanted pacemakers and implanted cardiac defibrillators. The FOB or KIPASS ECU must be kept more than 22 cm (9 in.) from these type of medical devices to avoid interference. Do not carry the FOB in your breast pocket. Operators with medical devices such as pacemakers and implanted cardiac defibrillators should consult with their doctors before use.

FOB Operational Cautions

NOTICE

Do not expose the FOB to excessively high temperature or more humid place.
Do not grind the FOB or alter its shape.
Do not put any magnetic materials with the FOB on the same key ring.
Do not put the FOB close to the other electric appliance (TV, Audio system, Personal Computer, etc) or medical appliance.
Do not submerge FOB in water.
Do not disassemble the FOB except of replacing the button battery.
Do not drop the FOB or apply shocks to it.
Do not polish the finish of the FOB by using the gasoline, polishing paint, or etc.
If FOB is lost, re-registry at dealer is securely required to prevent the possibility of theft.
If FOB and Spare FOB are lost, an authorized Kawasaki dealer will have to replace the ECU, and re-register the new FOB.

Key Registration

The key can be registered by the KDS 3 version kit.
Refer to the instructions in the KDS 3 version kit.

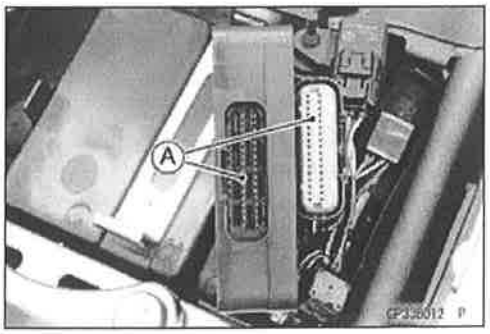
NOTE

○*If only one key is registered, the registration is not completed.*
○*It is necessary to register two keys or more to complete the key registration.*

KIPASS ECU Power Supply Inspection

- Remove the KIPASS ECU (see KIPASS ECU Replacement).
- Visually inspect the terminals [A] of the KIPASS ECU and main harness connectors.

★If the connector is clogged with mud or dust, blow it off with compressed air.
★Replace the main harness if the terminals of the main harness connector are cracked, bent, or otherwise damaged.
★Replace the KIPASS ECU if the terminals of the KIPASS ECU connector are cracked, bent, or otherwise damaged.



KIPASS

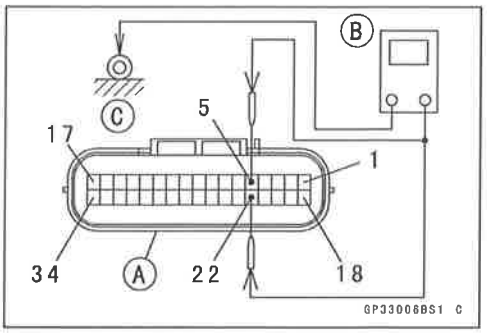
● With the KIPASS ECU connector [A] connected, check the following ground lead for continuity with the key knob "OFF," using a tester [B] and needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

ECU Grounding Inspection

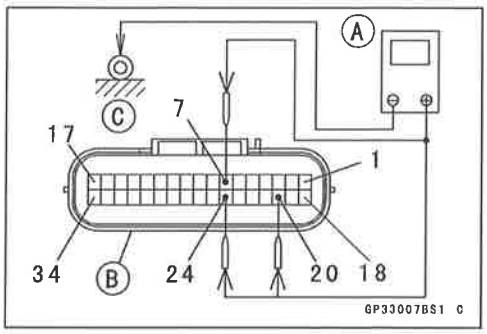
5 (BK/Y) Terminal	←→	**Frame Ground [C]: 0 Ω**
22 (BK/Y) Terminal	←→	**Frame Ground [C]: 0 Ω**
Engine Ground	←→	**Frame Ground [C]: 0 Ω**

★If no continuity, check the connector, the engine ground lead, or main harness, and repair or replace them if necessary.



● Check the KIPASS ECU power source voltage with the tester [A].

○Position the terminal in accordance with terminal numbers of KIPASS ECU connector [B] in the figure.



KIPASS ECU Power Source Voltage Inspection

Tester Connections		Key Knob Position	Reading
Tester (–)	**Tester (+)**		
Frame Ground [C]	LG lead [terminal 7]	OFF	Battery Voltage
		ON	Battery Voltage
		from ON to OFF	Battery Voltage
	LG lead [terminal 24]	OFF	Battery Voltage
		ON	Battery Voltage
		from ON to OFF	Battery Voltage
	R/W lead [terminal 20]*	OFF	0 V
		ON	Battery Voltage
		from ON to OFF	Battery Voltage for 5 seconds and then 0 V

*: Supply Voltage to Steering Lock Unit

★If the tester does not read as specified, check the following.

Power Source Wiring (see KIPASS Circuit)
Main Fuse 30 A (see Fuse Inspection)
KIPASS Fuse 10 A (see Fuse Inspection)

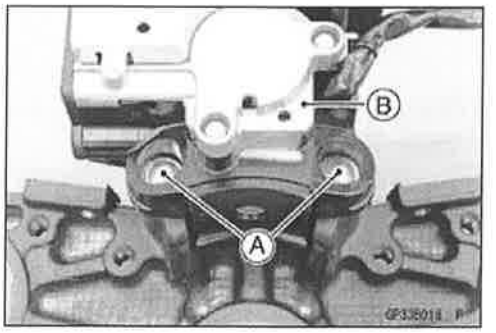
★If the wiring and fuse are good, replace the KIPASS ECU (see KIPASS ECU Replacement).

KIPASS

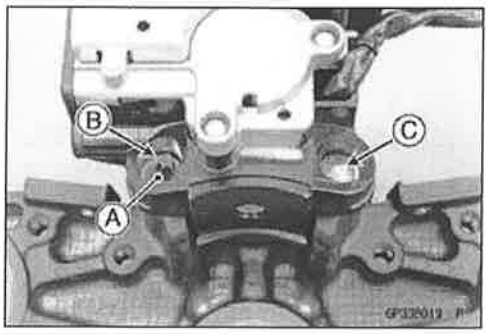
Steering Lock Unit Replacement

- Remove the left inner cover (see Inner Cover Removal in the Frame chapter).
- Disconnect the lead connectors [A].

- Remove:
  Steering Stem Head (see Stem, Stem Bearing Removal in the Steering chapter)
- Using a small chisel or punch, turn out the bolts [A].
- Remove the steering lock unit [B].

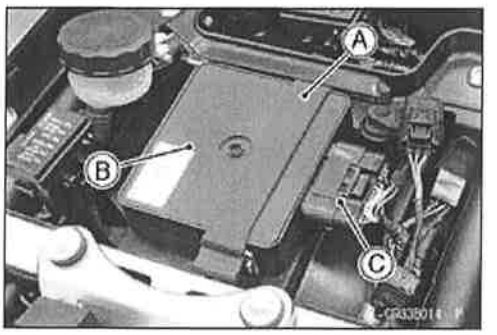


- Tighten a new Torx bolt [A] until the bolt head [B] is broken [C].
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).



KIPASS ECU Replacement

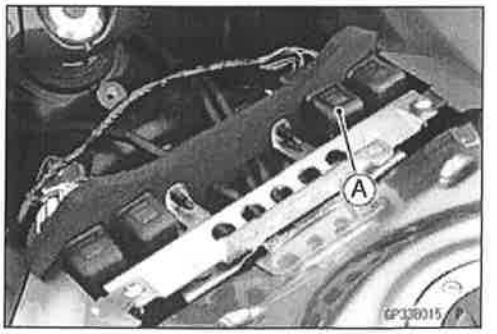
- Remove:
  Seat (see Seat Removal in the Frame chapter)
  Rubber Band [A]
  KIPASS ECU [B]
- Disconnect:
  Connector [C]
- Installation is the reverse of removal.



KIPASS Signal Relay Inspection

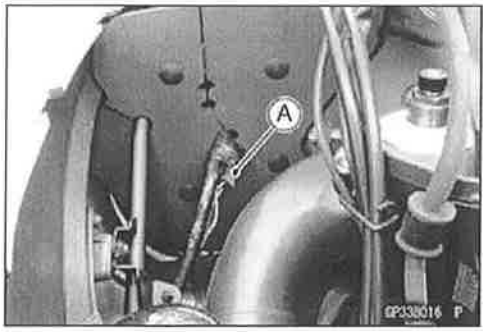
- Remove:
  Left Rear Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Refer to the Headlight Relay Inspection.

OThe KIPASS Signal Relay [A] is identical with the headlight relays.



KIPASS

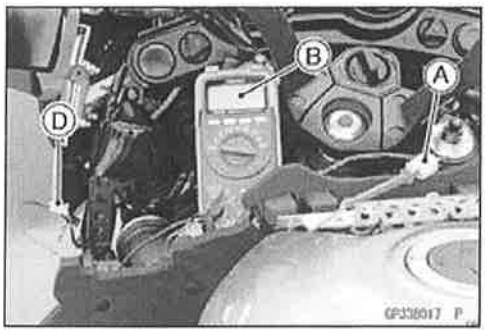
KIPASS Signal Diode Inspection



NOTE

○*The KIPASS signal diode [A] is in the main harness.*

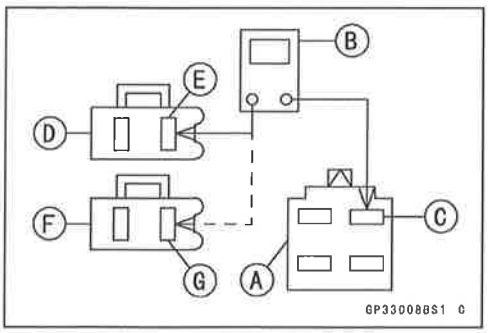
○*For the KIPASS signal diode inspection, check the resistance of the diode using the KIPASS signal relay connector and front turn signal light lead connector.*



- Remove:
  Middle Fairings (see Middle Fairing Removal in the Frame chapter)
- Disconnect:
  KIPASS Signal Relay Connector [A]
- Connect a tester [B] to the BL lead terminal [C] of the KIPASS signal relay connector and front turn signal light lead connector as shown.
  Front Left Turn Signal Light Lead Connector [D]
  G Lead Terminal [E]
  Front Right Turn Signal Light Lead Connector [F]
  GY Lead Terminal [G]
- Check the resistance in both directions of the above terminals.

○The resistance should be low in one direction and more than 10 times as much in the other direction.

★If any diode shows low or high in both directions, replace the main harness.

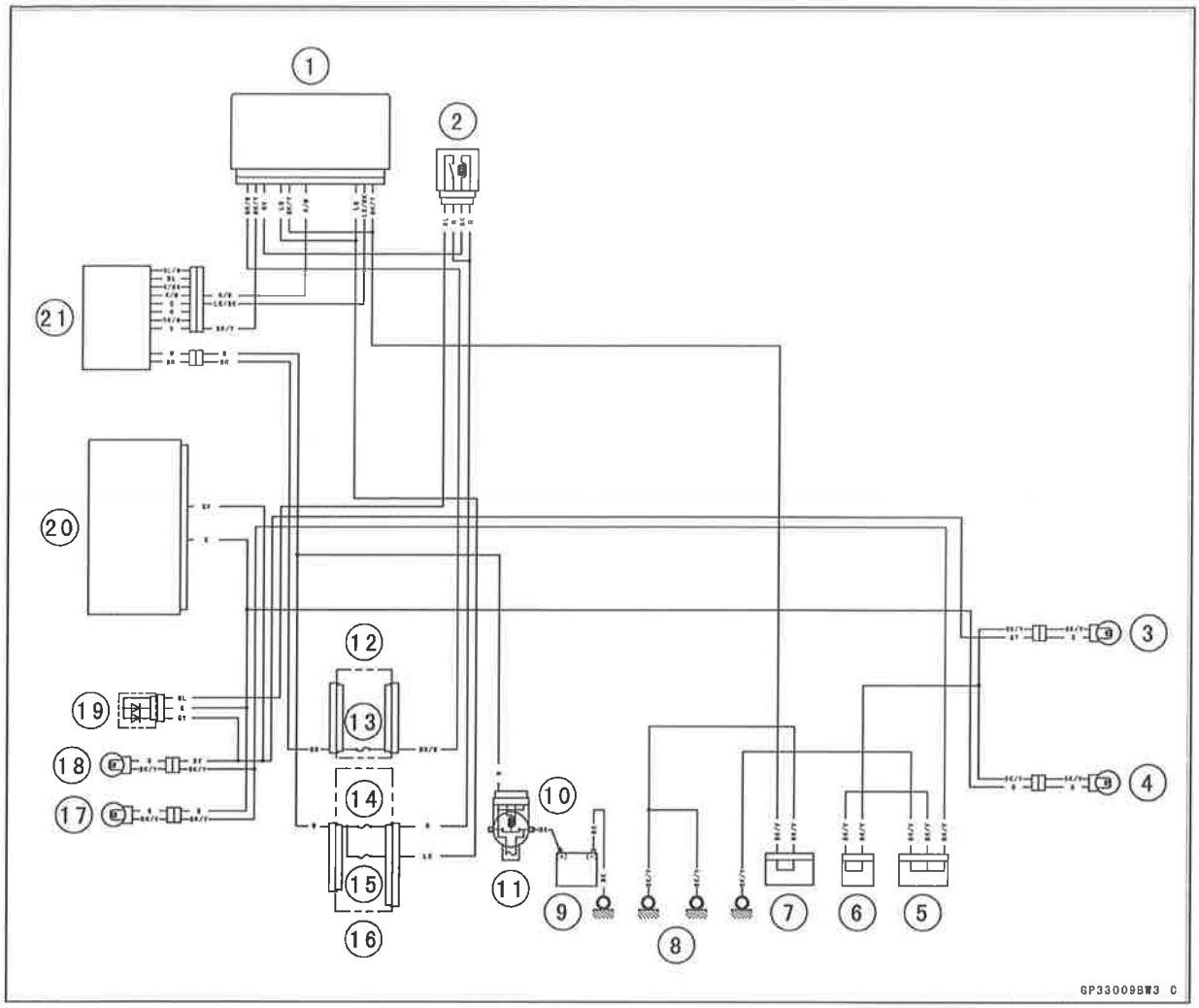


NOTE

○*The tester reading varies with the tester range, but generally speaking, the lower reading should be from zero to one half the scale.*

KIPASS

KIPASS Circuit



1. KIPASS ECU
2. KIPASS Signal Relay
3. Rear Right Turn Signal Light 12 V 21 W
4. Rear Left Turn Signal Light 12 V 21 W
5. Joint Connector 1
6. Joint Connector 2
7. Joint Connector 9
8. Frame Ground
9. Battery 12 V 14 Ah
10. Starter Relay
11. Main Fuse 30 A
12. Fuse Box 2
13. Ignition Fuse 15 A
14. KIPASS Signal Relay Fuse 10 A
15. KIPASS Fuse 10 A
16. Fuse Box 3
17. Front Left Turn Signal Light 12 V 21 W
18. Front Right Turn Signal Light 12 V 21 W
19. KIPASS Signal Diode
20. Meter Unit
21. Steering Lock Unit

Switches and Sensors

Brake Light Timing Inspection

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Brake Light Timing Adjustment

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Switch Inspection

- Using a tester, check to see that only the connections shown in the table have continuity (about zero ohms).

○For the switch housings and the steering lock unit, refer to the tables in the Wiring Diagram.

★If the switch has an open or short, repair it or replace it with a new one.

Rear Brake Light Switch Connections

Rear Brake Light Switch Connections		
Color	BR	BL
When brake pedal is pushed down	○———	———○
When brake pedal is released		

Side Stand Switch Connections

Side Stand Switch Connections		
Color	BK	G
When side stand is down		
When side stand is up	○———	———○

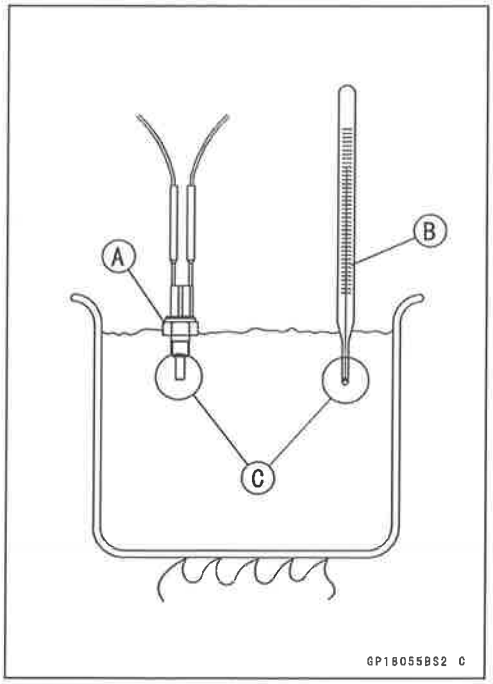
Oil Pressure Switch Connections*

Oil Pressure Switch Connections *		
Color	SW. Terminal	Ground
When engine is stopped	○———	———○
When engine is running		

*: Engine lubrication system is in good condition.

Switches and Sensors

Water Temperature Sensor Inspection



- Remove the water temperature sensor (see Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter).
- Suspend the sensor [A] in a container of coolant so that the threaded portion is submerged.
- Suspend an accurate thermometer [B] with temperature sensing portions [C] located in almost the same depth.

NOTE

○*The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using a digital meter, measure the internal resistance of the sensor.

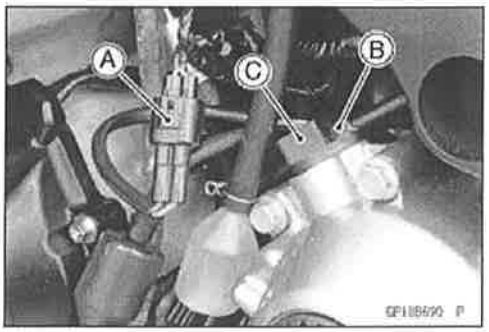
★If the digital meter does not show the specified values, replace the sensor.

Water Temperature Sensor Resistance

Temperature	Resistance (kΩ)
–20°C (–4°F)	*18.80 ±2.37
0°C (32°F)	*(about 6.544)
40°C (104°F)	1.136 ±0.095
100°C (212°F)	0.1553 ±0.0070

*: Reference Information

Speed Sensor Removal



- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- Disconnect the speed sensor lead connector [A].
- Remove:
  Bolt [B]
  Speed Sensor [C]

Speed Sensor Installation

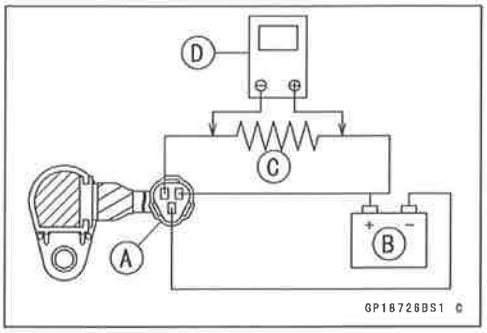
- Apply soap and water solution to the O-ring of the speed sensor.
- Apply a non-permanent locking agent to the threads of the speed sensor bolt.
- Install the speed sensor.
- Tighten:

Torque - Speed Sensor Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Switches and Sensors

Speed Sensor Inspection

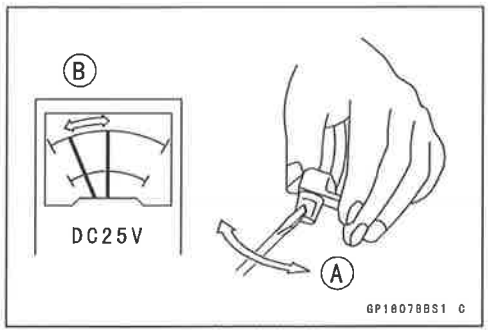
- Remove the speed sensor (see Speed Sensor Removal).
- Connect the speed sensor lead connector [A] with the battery [B], 10 kΩ resistor [C] and a tester [D] as shown.
- Set the tester to the DC 25 V range.



- Trace [A] each side of the speed sensor surface with the screwdriver.

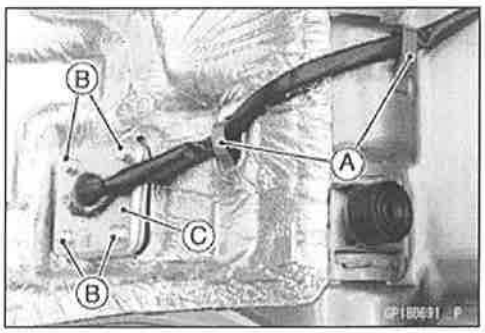
○Then the tester indicator should flick [B].

★If the tester indicator does not flick, replace the speed sensor.



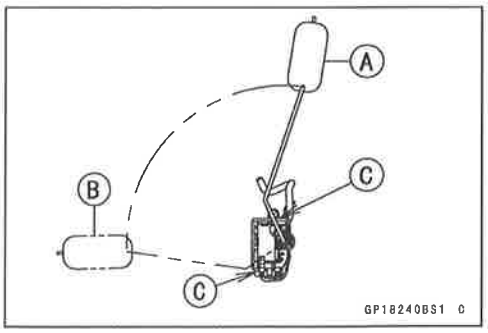
Fuel Level Sensor Inspection

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Open the clamps [A].
- Remove:
  Bolts [B]
  Fuel Level Sensor [C]



- Check that the float moves up and down smoothly without binding. It should go down under its own weight.

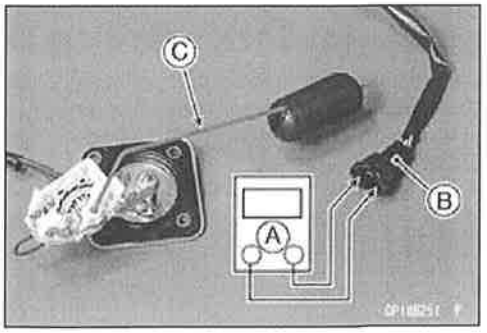
★If the float does not move smoothly, replace the sensor.
  Float in Full Position [A]
  Float in Empty Position [B]
  Float Arm Stoppers [C]



- Using a tester [A], measure the resistance across the terminals in the fuel level sensor lead connector [B].

★If the tester readings are not as specified, or do not change smoothly according as the float moves up and down, replace the sensor.

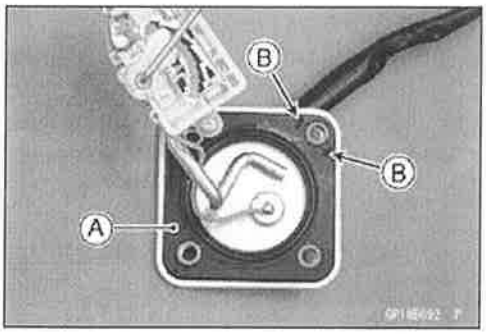
Fuel Level Sensor Resistance
Standard: Full Level Position [C]: 9 ~ 11 Ω
Empty Level Position: 213 ~ 219 Ω



Switches and Sensors

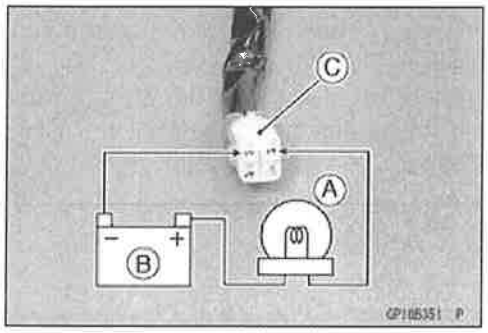
- Install a new gasket [A] on the fuel level sensor as shown. Hollows [B]
- Apply a non-permanent locking agent to the fuel level sensor bolts and tighten them.

Torque - Fuel Level Sensor Bolts: 7.0 N·m (0.71 kgf·m, 62 in·lb)



Fuel Reserve Switch Inspection

- Fill the fuel tank with fuel.
- Close the fuel tank cap surely.
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Connect the test light [A] (12 V 3.4 W bulb in a socket with leads) and the 12 V battery [B] to the fuel pump connector [C].



Connections

Battery (+) → 12 V 3.4 W Bulb (one side)

12 V 3.4 W Bulb (other side) → BK/R Lead Terminal

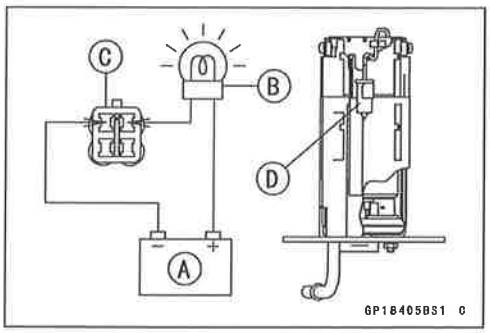
Battery (–) → BK/W Lead Terminal

Special Tool - Needle Adapter Set: 57001-1457

★If the test light turn on, the reserve switch is defective. Replace the fuel pump.

- Remove the fuel pump (see Fuel Pump Removal in the Fuel System (DFI) chapter).
- Connect the test light (12 V 3.4 W bulb in a socket with leads) and the 12 V battery to the fuel pump connector as shown.

12 V Battery [A]
Test Light [B]
Fuel Pump Connector [C]
Fuel Reserve Switch [D]



★If the test light does not light, replace the fuel pump.

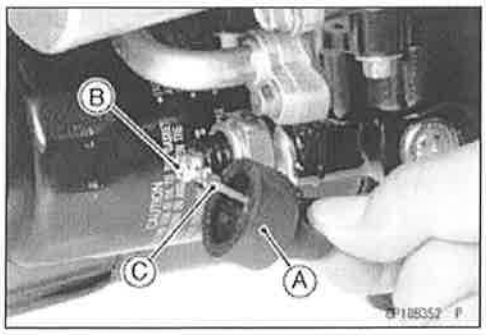
NOTE

○*It may take a long time to turn on the test light in case that the fuel reserve switch is inspected just after the fuel pump is removed. Leave the fuel reserve switch with leads for inspection connected for few minutes.*

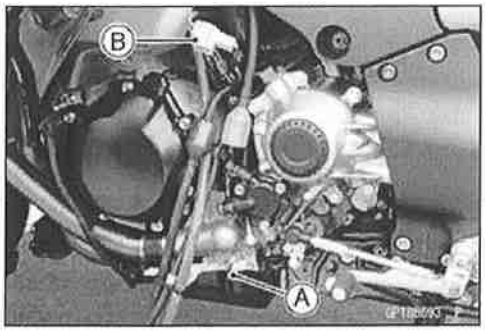
Switches and Sensors

Gear Position Switch Removal

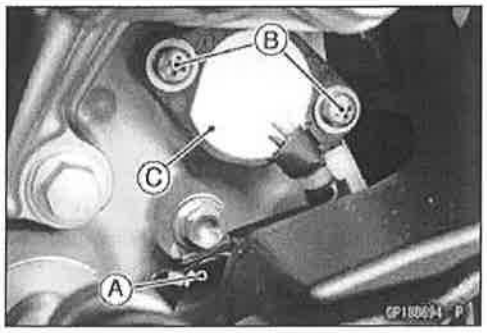
- Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
- Slide off the rubber boot [A].
- Loosen the oil pressure switch terminal bolt [B], and remove the switch lead [C].



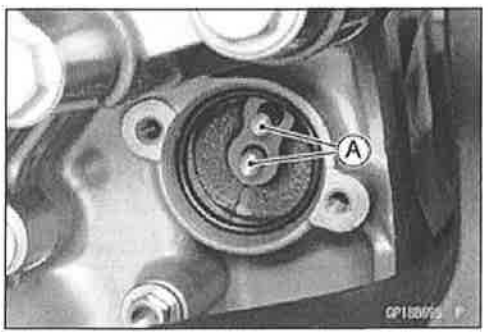
- Open the clamp [A].
- Disconnect the oil pressure switch/gear position switch lead connector [B].



- Open the clamp [A].
- Remove:
  Screws [B]
  Gear Position Switch [C]

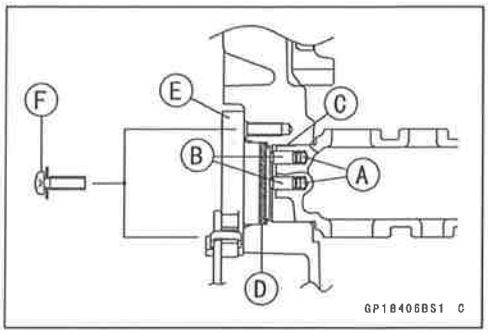


- Remove the pins [A] and springs from the shift drum.



Switches and Sensors

Gear Position Switch Installation



- Securely place the springs [A] and pins [B] into the holes of the shift drum [C].
- Apply soap and water solution to the new O-ring [D].
- Install the gear position switch [E] so that the switch sticks to the engine.
- Apply a non-permanent locking agent to the gear position switch screws [F].
- Tighten:

Torque - Gear Position Switch Screws: 2.9 N·m (0.30 kgf·m, 26 in·lb)

- Run the gear position switch and oil pressure switch lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Gear Position Switch Inspection

NOTE

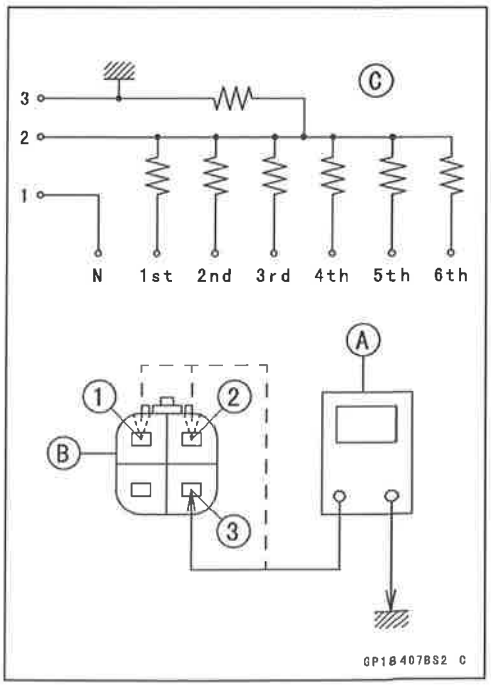
○*Be sure the transmission mechanism is good condition.*

- Disconnect the oil pressure switch/gear position switch lead connector [A].

- Connect a tester [A] to the terminals in the oil pressure switch/gear position switch lead connector [B] and ground.

○When changing the gear position from lower gear to higher gear by the change pedal operated, using the center stand and rotate the rear wheel by hand.

[C] Internal Circuit
[1] LG Lead
[2] G/R Lead
[3] BK Lead



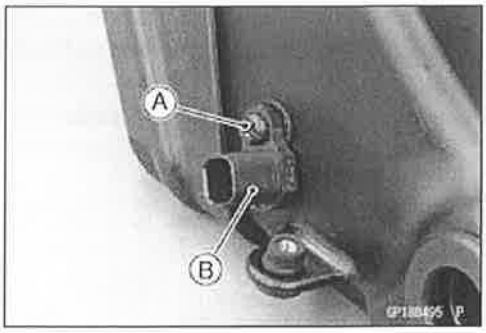
Gear Position Switch Resistance **(kΩ)**

Gear Position	Connections		
	[1]-Ground	[2]-Ground	[3]-Ground
Neutral	about 0	8.64 ~ 9.54	about 0
1st	–	2.22 ~ 2.46	about 0
2nd	–	1.42 ~ 1.58	about 0
3rd	–	0.954 ~ 1.055	about 0
4th	–	0.643 ~ 0.711	about 0
5th	–	0.410 ~ 0.453	about 0
OD	–	0.241 ~ 0.266	about 0

★If the tester reading is not as specified, replace the gear position switch with a new one.

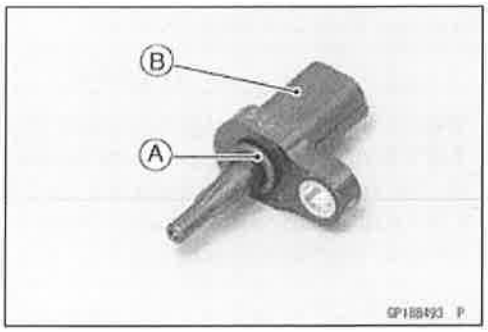
Switches and Sensors

Outside Temperature Sensor Removal



- Remove:
  Front Air Intake Duct (see Front Air Intake Duct Removal in the Fuel System (DFI) chapter)
  Screw [A]
  Outside Temperature Sensor [B]

Outside Temperature Sensor Installation

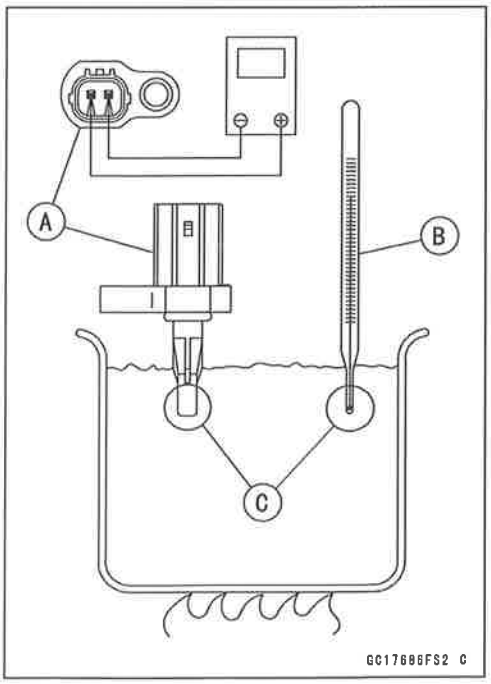


- Check that the O-ring [A] is in place on the outside temperature sensor [B].
- Tighten:

Torque - Outside Temperature Sensor Screw: 0.50 N·m (0.05 kgf·m, 4.4 in·lb)

- Install:
  Upper Fairing (see Upper Fairing Installation in the Frame chapter)

Outside Temperature Sensor Inspection



- Remove the outside temperature sensor (see Outside Temperature Sensor Removal).
- Suspend the sensor [A] in a container of machine oil so that the heat-sensitive portion is submerged.
- Suspend a thermometer [B] with the heat-sensitive portion [C] located in almost the same depth with the sensor.

NOTE

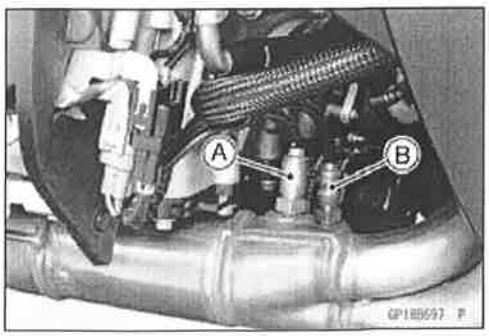
○*The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the oil while stirring the oil gently for even temperature.
- Using a digital meter, measure the internal resistance of the sensor across the terminals at the temperatures shown in the following.

Outside Temperature Sensor Resistance
Standard: 5.4 ~ 6.6 kΩ @0°C (32°F)
0.29 ~ 0.39 kΩ @80°C (176°F)

★If the reading is out of the standard, replace the sensor.

Oxygen Sensor Removal

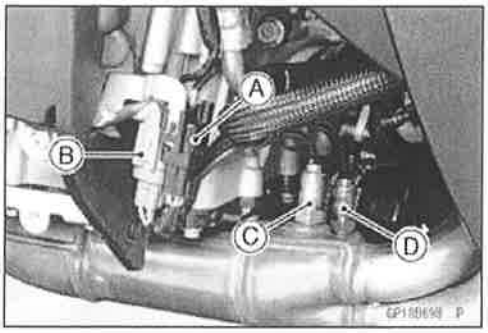


NOTE

○*The oxygen sensor itself is the same for #1 [A] and #2 [B], but wiring of the main harness side is different.*

Switches and Sensors

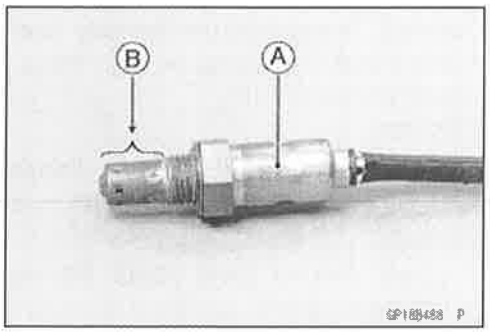
- Remove the right front middle fairing (see Front Middle Fairing Removal in the Frame chapter).
- Disconnect:
  Oxygen Sensor #1 Lead Connector [A]
  Oxygen Sensor #2 Lead Connector [B]
- Remove:
  Oxygen Sensor #1 [C]
  Oxygen Sensor #2 [D]



Oxygen Sensor Installation

NOTICE

Never drop the oxygen sensor [A], especially on a hard surface. Such a shock to the unit can damage it. Do not touch the sensing part [B] to prevent oil contact. Oil contamination from hands can reduce sensor performance.



- Tighten:

Torque - Oxygen Sensors: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Run the oxygen sensor leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Oxygen Sensor Inspection

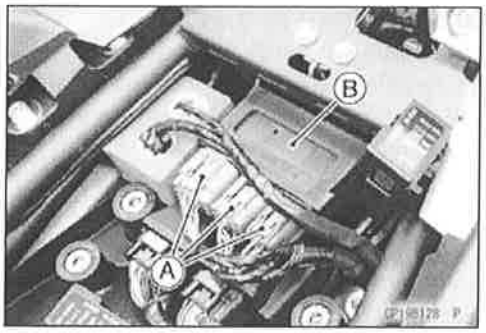
- Refer to the Oxygen Sensor #1/#2 Input Voltage Inspection in the Self-Diagnosis System chapter.

Oxygen Sensor Heater Inspection

- Refer to the Oxygen Sensor Heater Resistance Inspection in the Self-Diagnosis System chapter.

Relay Box and Accessory Relay

Relay Box Removal



- Remove:
  Seat (see Seat Removal in the Frame chapter)
  Tool Kit Case (see ECU Removal in the Fuel System (DFI) chapter)
- Disconnect the connectors [A].
- Remove the relay box [B].

NOTE

○*The relay box has relays and diodes. The relays and diodes can not be removed.*

Relay Circuit Inspection

- Remove the relay box.
- Check conductivity of the following numbered terminals by connecting a tester and one 12 V battery to the relay box as shown (see Relay Box Internal Circuit).

★If the tester does not read as specified, replace the relay box.

Relay Circuit Inspection (with the battery disconnected)

	Tester Connection	Tester Reading (Ω)
Headlight Circuit Relay	1-3	∞
ECU Main Relay**	6-7	∞
	4-5	Not ∞*
Fuel Pump Relay	7-8	∞
	9-10	Not ∞*
Starter Circuit Relay	11-16	∞
	11-12	∞
Fan Relay	17-20	∞
	18-19	Not ∞*

*: The actual reading varies with the tester used.
**: In this motorcycle, the ECU main relay is not used.

Relay Circuit Inspection (with the battery connected)

	Battery Connection (+) (–)	Tester Connection	Tester Reading (Ω)
ECU Main Relay	2-11	1-3	0
	4-5	7-6	0
Fuel Pump Relay	9-10	7-8	0
Fan Relay	18-19	17-20	0

	Battery Connection (+) (–)	Tester Connection DC 25 V Range (+) (–)	Tester Reading (V)
Starter Circuit Relay	16-12	11-12	Battery Voltage

(+): Apply positive lead.
(–): Apply negative lead.

Relay Box and Accessory Relay

Diode Circuit Inspection

- Remove the relay box (see Relay Box Removal).
- Check conductivity of the following pairs of terminals (see Relay Box Internal Circuit).

Diode Circuit Inspection

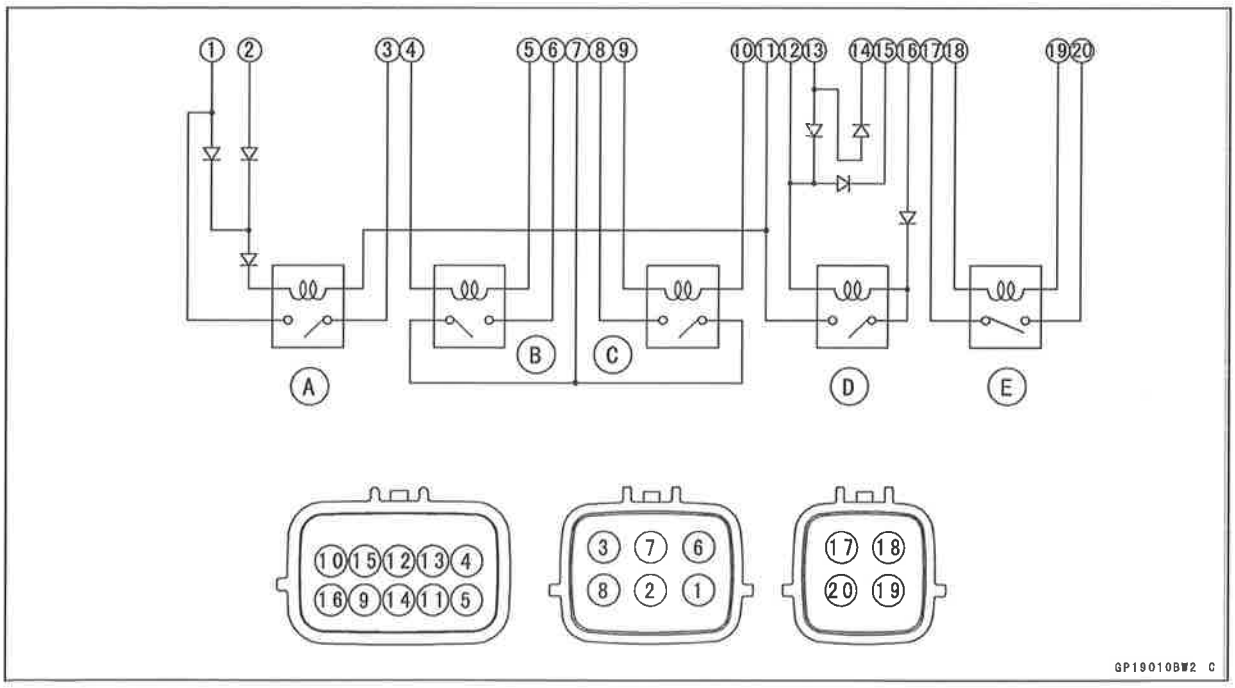
Tester Connection	1-11, 2-11, 12-13, 12-15, 12-16, 13-14, 13-15

★The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the relay box must be replaced.

NOTE

○*The actual meter reading varies with the meter or tester used and the individual diodes, but generally speaking, the lower reading should be from zero to one half the scale.*

Relay Box Internal Circuit

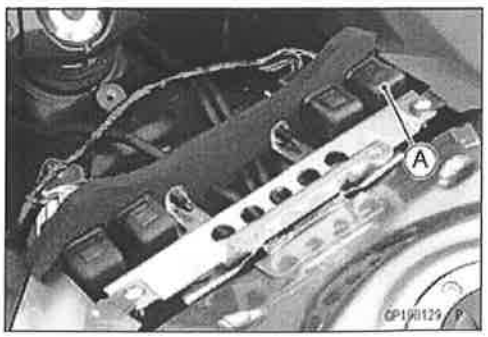


A. Headlight Circuit Relay
B. ECU Main Relay (Unused)
C. Fuel Pump Relay
D. Starter Circuit Relay
E. Fan Relay

Accessory Relay Inspection

- Remove:
  Front Fuel Tank Cover (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Refer to the Headlight Relay Inspection.

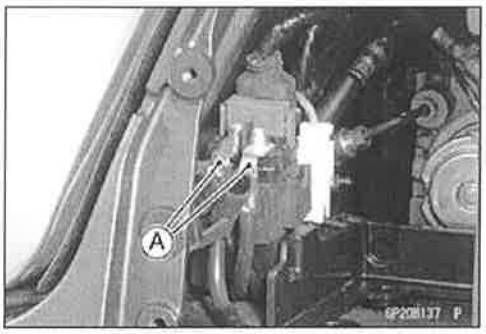
○The accessory relay [A] is identical with the headlight relays.



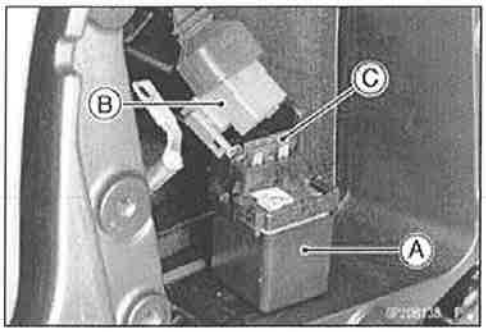
Fuse

30 A Main Fuse Removal

- Remove:
  Battery (see Battery Removal)
  Bolts and Cable Terminals [A]

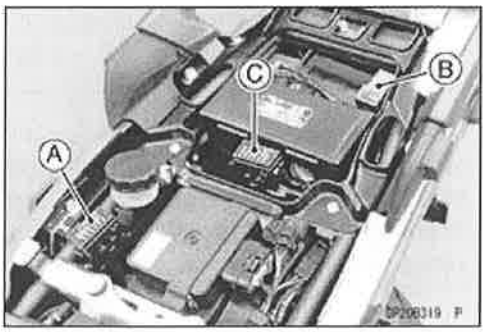


- Take out the starter relay assembly [A].
- Disconnect the 30 A main fuse connector [B].
- Pull out the 30 A main fuse [C] from the starter relay assembly.

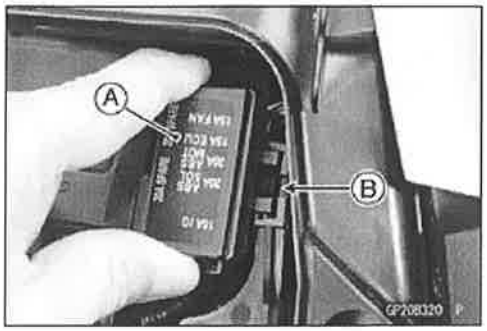


Fuse Box Fuse Removal

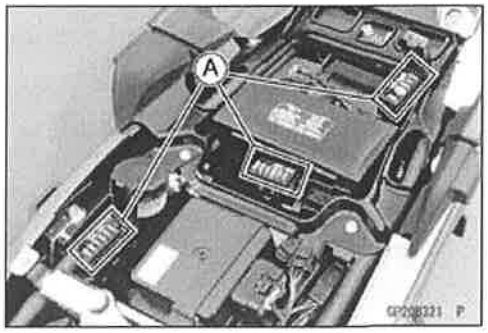
- Remove the seat (see Seat Removal in the Frame chapter).
  Fuse Box 1 [A]
  Fuse Box 2 [B]
  Fuse Box 3 [C]
- Unlock each hook to lift up the each lid.



- For the fuse box 2 [A], push the projection [B] with a screwdriver to clear the stopper and remove it.



- Pull the fuses [A] straight out of the fuse box with needle nose pliers.



Fuse

Fuse Installation

★If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.

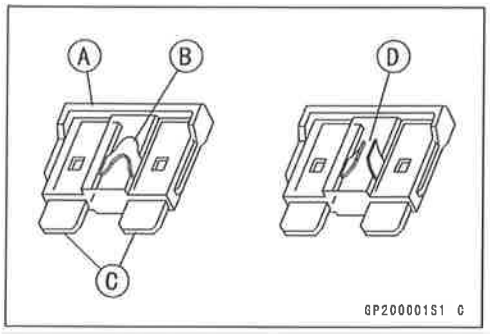
- Install the fuse box fuses on the original position as specified on the lid.

Fuse Inspection

- Remove the fuse.
- Inspect the fuse element.

★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

Housing [A]
Fuse Element [B]
Terminals [C]
Blown Element [D]



NOTE

○*If the engine is operated under the condition which the battery needs refreshing charge, a main fuse may blow out due to a mass current flows to the battery.*

NOTICE

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

Self-Diagnosis System

Table of Contents

Specifications 17-4
Special Tools 17-6
Self-Diagnosis 17-7
  Self-Diagnosis Outline 17-7
  Self-Diagnosis Procedures 17-8
  Self-Diagnosis Flow Chart 17-10
  Service Code Reading 17-11
  Service Code Erasing 17-12
  Backups 17-14
Main Throttle Sensor (Service Code 11) 17-18
  Main Throttle Sensor Removal/Adjustment 17-18
  Main Throttle Sensor Input Voltage Inspection 17-18
  Main Throttle Sensor Output Voltage Inspection 17-19
  Main Throttle Sensor Resistance Inspection 17-21
Intake Air Pressure Sensor (Service Code 12) 17-22
  Intake Air Pressure Sensor Removal 17-22
  Intake Air Pressure Sensor Installation 17-22
  Intake Air Pressure Sensor Input Voltage Inspection 17-23
  Intake Air Pressure Sensor Output Voltage Inspection 17-24
Intake Air Temperature Sensor (Service Code 13) 17-28
  Intake Air Temperature Sensor Removal 17-28
  Intake Air Temperature Sensor Installation 17-28
  Intake Air Temperature Sensor Output Voltage Inspection 17-28
  Intake Air Temperature Sensor Resistance Inspection 17-29
Water Temperature Sensor (Service Code 14) 17-31
  Water Temperature Sensor Removal/Installation 17-31
  Water Temperature Sensor Output Voltage Inspection 17-31
  Water Temperature Sensor Resistance Inspection 17-32
Atmospheric Pressure Sensor (Service Code 15) 17-33
  Atmospheric Pressure Sensor Removal 17-33
  Atmospheric Pressure Sensor Installation 17-33
  Atmospheric Pressure Sensor Input Voltage Inspection 17-33
  Atmospheric Pressure Sensor Output Voltage Inspection 17-34
Crankshaft Sensor (Service Code 21) 17-38
  Crankshaft Sensor Removal/Installation 17-38
  Crankshaft Sensor Resistance Inspection 17-38
  Crankshaft Sensor Peak Voltage Inspection 17-38
Camshaft Position Sensor (Service Code 23, 26) 17-39
  Camshaft Position Sensor Removal/Installation 17-39
  Camshaft Position Sensor Resistance Inspection 17-39
  Camshaft Position Sensor Peak Voltage Inspection 17-39
Speed Sensor (Service Code 24) 17-40
  Speed Sensor Removal/Installation 17-40
  Speed Sensor Input Voltage Inspection 17-40
  Speed Sensor Output Voltage Inspection 17-41
Gear Position Switch (Service Code 25) 17-43
  Gear Position Switch Removal/Installation 17-43
  Gear Position Switch Resistance Inspection 17-43
  Gear Position Switch Output Voltage Inspection 17-43
Front and/or Rear Wheel Rotation Sensor Signal (Service Code 27) 17-45

Front and/or Rear Wheel Rotation Sensor Signal Inspection 17-45
Vehicle-down Sensor (Service Code 31) 17-47
Vehicle-down Sensor Removal 17-47
Vehicle-down Sensor Installation 17-48
Vehicle-down Sensor Input Voltage Inspection 17-49
Vehicle-down Sensor Output Voltage Inspection 17-50
Subthrottle Sensor (Service Code 32) 17-52
Subthrottle Sensor Removal/Adjustment 17-52
Subthrottle Sensor Input Voltage Inspection 17-52
Subthrottle Sensor Output Voltage Inspection 17-53
Subthrottle Sensor Resistance Inspection 17-55
Oxygen Sensor #1 - not activated (Service Code 33) 17-56
Oxygen Sensor #1 Removal/Installation 17-56
Oxygen Sensor #1 Inspection 17-56
Steering Lock Unit and ECU Communication Error (Service Code 37, 38) 17-59
Steering Lock Unit and ECU Communication Line Inspection 17-59
KIPASS ECU Communication Error (Service Code 39) 17-60
KIPASS ECU Communication Line Inspection 17-60
Fuel Pump Relay (Service Code 46) 17-61
Fuel Pump Relay Removal/Installation 17-61
Fuel Pump Relay Inspection 17-61
Stick Coils #1, #2, #3, #4: (Service Code 51, 52, 53, 54) 17-62
Stick Coil Removal/Installation 17-62
Stick Coil Primary Winding Resistance Inspection 17-62
Stick Coil Input Voltage Inspection 17-62
Radiator Fan Relay (Service Code 56) 17-64
Radiator Fan Relay Removal/Installation 17-64
Radiator Fan Relay Inspection 17-64
Variable Valve Timing and Oil Control Solenoid Valve (Service Code 59, 65) 17-65
Oil Control Solenoid Valve Removal/Installation 17-65
Oil Control Solenoid Valve Inspection 17-65
Subthrottle Valve Actuator (Service Code 62) 17-68
Subthrottle Valve Actuator Removal 17-68
Subthrottle Valve Actuator Inspection 17-68
Subthrottle Valve Actuator Resistance Inspection 17-68
Subthrottle Valve Actuator Input Voltage Inspection 17-69
Air Switching Valve (Service Code 64) 17-71
Air Switching Valve Removal/Installation 17-71
Air Switching Valve Inspection 17-71
Oxygen Sensor Heater #1 and/or #2 (Service Code 67) 17-72
Oxygen Sensor Heater Removal/Installation 17-72
Oxygen Sensor Heater Resistance Inspection 17-72
Oxygen Sensor Heater Power Source Voltage Inspection 17-73
Steering Lock Unit (Service Code 68) 17-75
Steering Lock Unit Removal/Installation 17-75
Steering Lock Unit Inspection 17-75
Oxygen Sensor #2 - not activated (Service Code 83) 17-76
Oxygen Sensor #2 Removal/Installation 17-76
Oxygen Sensor #2 Inspection 17-76
KTRC Button (Service Code 89) 17-79
KTRC Button Inspection 17-79
Meter Unit and K-ACT ABS Hydraulic Unit Communication Error (Service Code 1A) 17-81
Meter Unit and K-ACT ABS Hydraulic Unit Communication Line Inspection 17-81
K-ACT ABS Hydraulic Unit Communication Error (Service Code 1B) 17-82
K-ACT ABS Hydraulic Unit Communication Line Inspection 17-82
Ground Wiring (ECU Terminal 23) (Service Code 2C) 17-83
Ground Wiring (ECU Terminal 23) Inspection 17-83

K-ACT ABS Service Codes 17-84
Solenoid Valve Inspection (Service Code B 13, B 14, B 17, B 18) 17-84
K-ACT ABS Solenoid Valve Relay Inspection (Service Code B 19) 17-84
Front Combine Valve Inspection (Service Code B 21, B 22) 17-84
Front, Rear Wheel Rotation Difference Abnormal Inspection (Service Code B 25) 17-85
K-ACT ABS Motor Relay Inspection (Service Code B 35) 17-85
Front Wheel Rotation Sensor Signal Abnormal (Service Code B 42) 17-85
Front Wheel Rotation Sensor Wiring Inspection (Service Code B 43) 17-86
Rear Wheel Rotation Sensor Signal Abnormal (Service Code B 44) 17-86
Rear Wheel Rotation Sensor Wiring Inspection (Service Code B 45) 17-87
Power Supply Voltage Inspection (Low-Voltage) (Service Code B 52) 17-87
Power Supply Voltage Inspection (Over-Voltage) (Service Code B 53) 17-88
K-ACT ABS Solenoid Valve Relay Supply Voltage Inspection (Low-Voltage) (Service Code B 54) 17-88
ECU Inspection (Service Code B 55) 17-88
CAN Bus OFF Monitor Inspection (Service Code B 57)K-ACT ABS Button Signal CAN Monitor (Service Code B 58) 17-88
K-ACT ABS Button Short Inspection (Service Code B 59) 17-89
High Pressure Switching/Switching Valve Inspection (Service Code B 71, B 72, B 73, B 74) 17-90
Input Fluid Pressure Sensor (Front Brake) Wiring Inspection (Service Code B 81) 17-90
Input Fluid Pressure Sensor (Front Brake) Offset Abnormal (Service Code B 82) 17-90
Output Fluid Pressure Sensor (Front Brake) Wiring Inspection (Service Code B 83) 17-90
Output Fluid Pressure Sensor (Front Brake) Offset Abnormal (Service Code B 84) 17-90
Input Fluid Pressure Sensor (Rear Brake) Wiring Inspection (Service Code B 85) 17-91
Input Fluid Pressure Sensor (Rear Brake) Offset Abnormal (Service Code B 86) 17-91
Output Fluid Pressure Sensor (Rear Brake) Wiring Inspection (Service Code B 87) 17-91
Output Fluid Pressure Sensor (Rear Brake) Offset Abnormal (Service Code B 88) 17-91
Fluid Pressure Sensor Supply Voltage Inspection (Service Code B 89) 17-91
Front Fluid Pressure Sensor Signal Inspection (Service Code B 91) 17-92
Rear Fluid Pressure Sensor Signal Inspection (Service Code B 92) 17-92
Warning Messages 17-93
Warning Message Table 17-93

Specifications

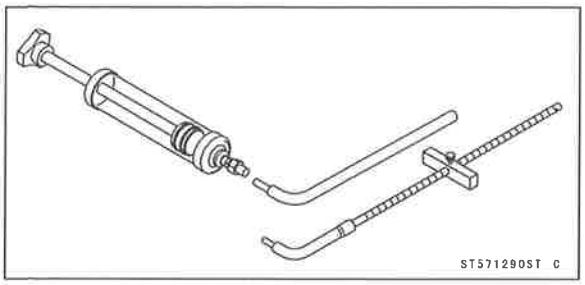
Item	Standard
Digital Fuel Injection System	
Main Throttle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 0.52 ~ 0.72 V at idle throttle opening DC 3.90 ~ 4.10 V at full throttle opening (for reference)
Resistance	4 ~ 6 kΩ
Intake Air Pressure Sensor/Atmospheric Pressure Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg)
Intake Air Temperature Sensor:	
Output Voltage	About DC 2.25 ~ 2.50 V @20°C (68°F)
Resistance	5.4 ~ 6.6 kΩ @0°C (32°F) 0.29 ~ 0.39 kΩ @80°C (176°F)
Water Temperature Sensor:	
Output Voltage	About DC 2.80 ~ 2.97 V @20°C (68°F)
Speed Sensor:	
Input Voltage	About DC 9 ~ 11 V
Output Voltage	About DC 0.6 V or less, or 4.8 V or more at ignition switch ON and 0 km/h
Vehicle-down Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	With sensor tilted 60 ~ 70° or more right or left: DC 0.65 ~ 1.35 V With sensor arrow mark pointed up: DC 3.55 ~ 4.45 V
Subthrottle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 4.05 ~ 4.25 V at subthrottle valve full close position (for reference) DC 0.61 ~ 0.81 V at subthrottle valve full open position
Resistance	4 ~ 6 kΩ
Subthrottle Valve Actuator:	
Resistance	About 5 ~ 7 Ω
Input Voltage	About DC 8.5 ~ 10.5 V and then 0 V or About DC 8.5 ~ 10.5 V
Oxygen Sensor	
Output Voltage (Rich)	DC 0.8 V or more
Output Voltage (Lean)	DC 0.24 V or less
Heater Resistance	6.7 ~ 10.5 Ω @20°C (68°F)
CAN Communication Line:	
Resistance	123 ~ 125 Ω at ECU Connector 114 ~ 126 Ω at KIPASS ECU Connector

Specifications

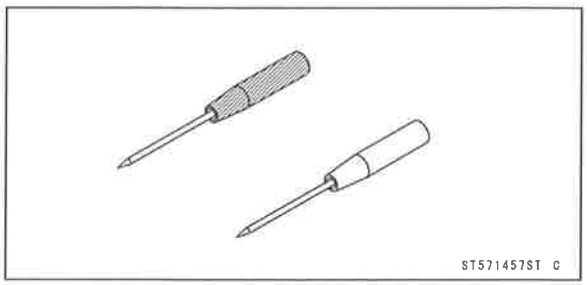
K-ACT ABS System	
Wheel Rotation Sensor Air Gap:	
Front	0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)
Rear	0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)
CAN Communication Line Resistance	30 ~ 70 Ω
CAN Communication Line/Ground Resistance	5 ~ 30 kΩ

Special Tools

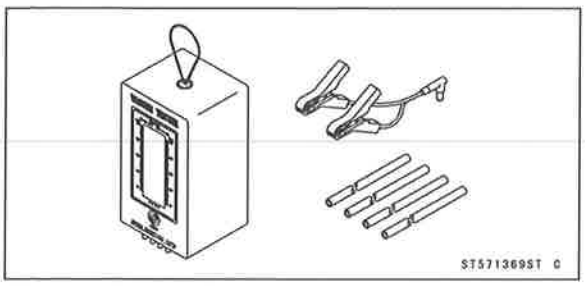
Fork Oil Level Gauge:
57001-1290



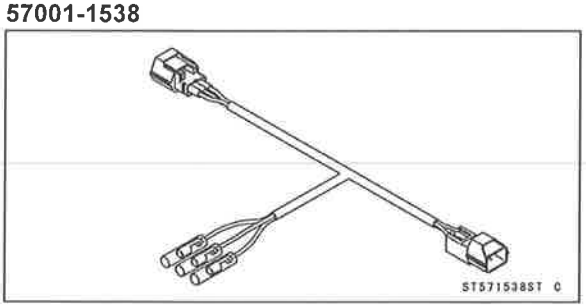
Needle Adapter Set:
57001-1457



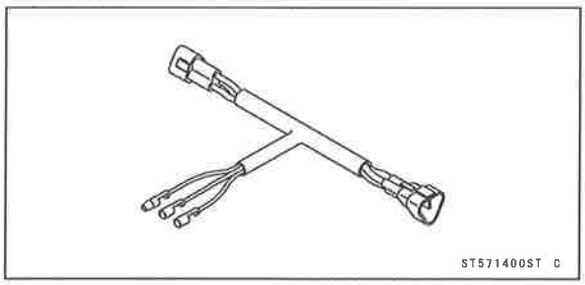
Vacuum Gauge:
57001-1369



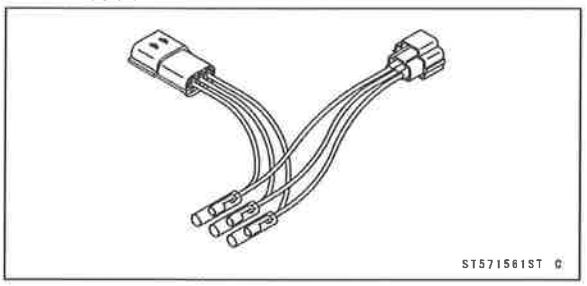
Throttle Sensor Setting Adapter:
57001-1538



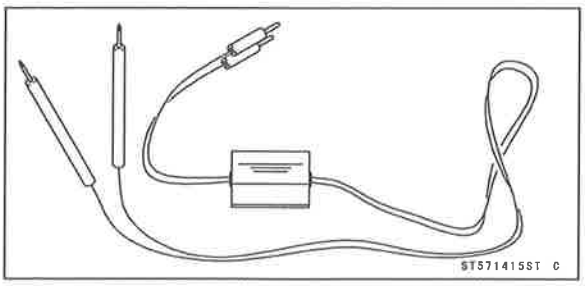
Throttle Sensor Setting Adapter #1:
57001-1400



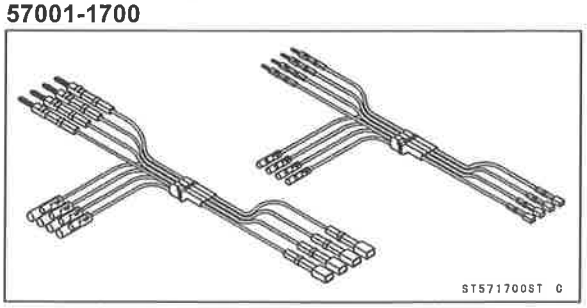
Sensor Harness Adapter:
57001-1561



Peak Voltage Adapter:
57001-1415



Measuring Adapter:
57001-1700



Self-Diagnosis

Self-Diagnosis Outline

The self-diagnosis system is monitoring the following mechanisms.

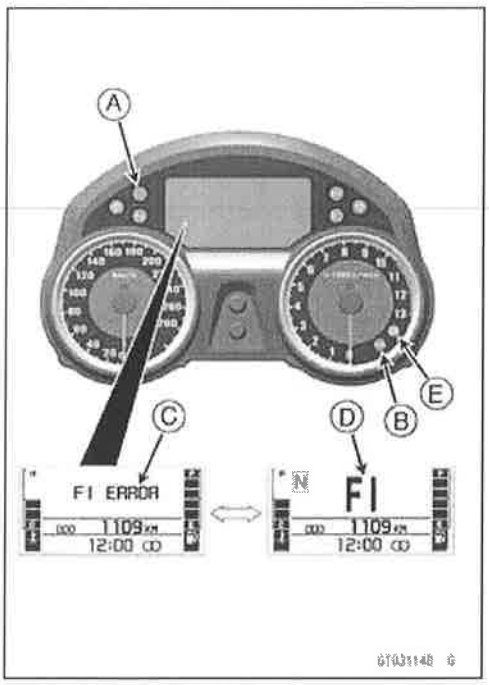
DFI System and Ignition System
KIPASS
Tire Pressure Sensor
KTRC System
K-ACT ABS

The self-diagnosis system has two modes and can be switched to another mode by operating the meter unit.

User Mode

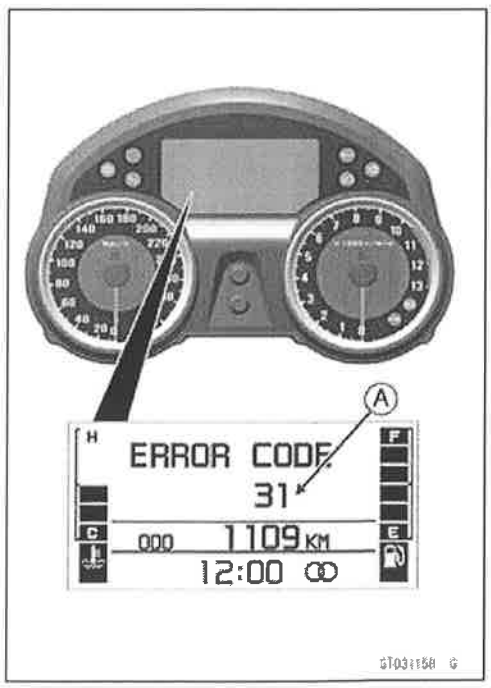
The ECU notifies the rider of troubles in DFI system , ignition system, KIPASS and KTRC system by lighting up the red warning indicator light (LED) [A] and yellow KTRC indicator light (LED) [B], and displaying the warning message [C] and warning indicator [D] alternately on the LCD (Liquid Crystal Display) when DFI, ignition, KIPASS and KTRC system parts are faulty, and initiates fail-safe function. In case of serious troubles, ECU stops the injection/ignition/starter motor operation.

For K-ACT ABS, yellow K-ACT ABS indicator light (LED) [E] goes on.



Dealer Mode

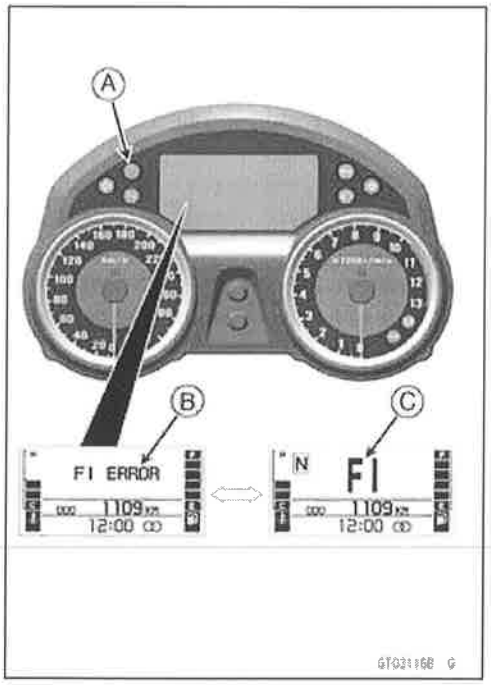
The LCD (Liquid Crystal Display) display the service code(s) [A] to show the problem(s) which the above system has at the moment of diagnosis.



Self-Diagnosis

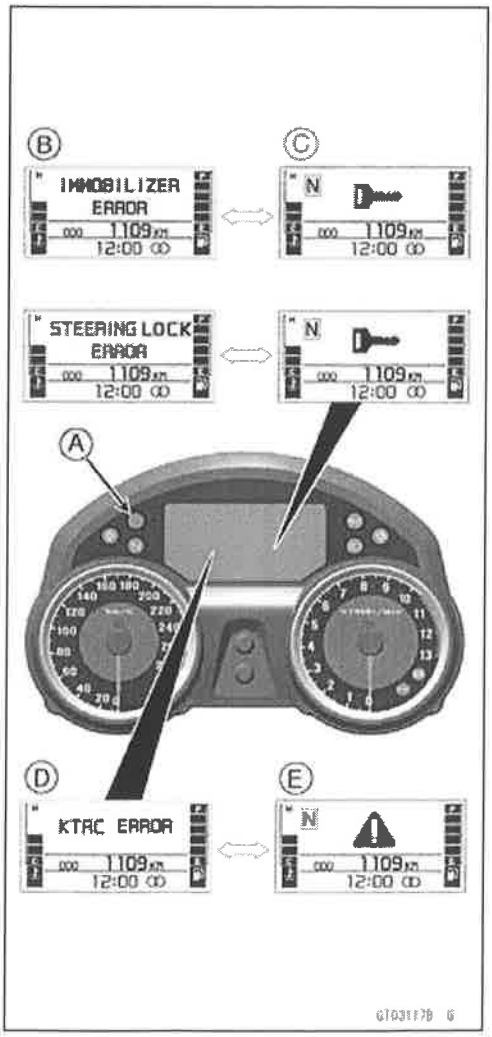
Self-Diagnosis Procedures

○When a problem occurs with DFI system and ignition system, the red warning indicator (LED) [A] goes on and FI warning message [B] and FI warning indicator [C] are displayed alternately on the LCD (Liquid Crystal Display) to alert the rider.



○When a problem occurs with KIPASS, the red warning indicator light (LED) [A] goes on and KIPASS warning message [B] and KIPASS warning indicator [C] are alternately displayed on the LCD.

○When a problem occurs with KTRC system , the red warning indicator light (LED) goes on and KTRC warning message [D] and warning indicator [E] are alternately displayed on the LCD.

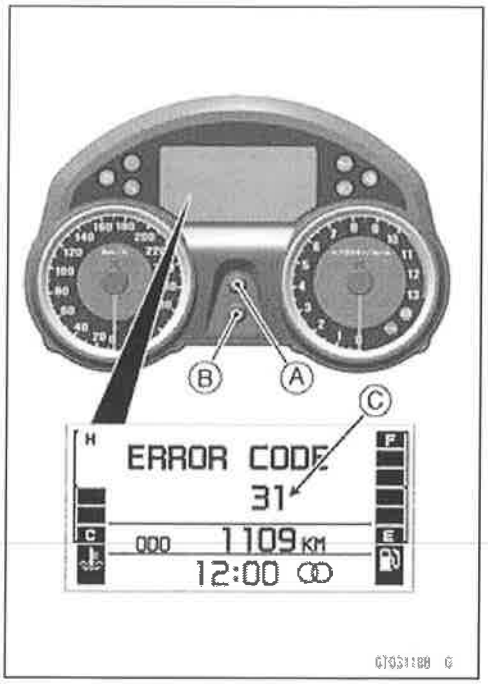


Self-Diagnosis

- Push the upper meter button [A] and lower meter button [B] for more than two seconds.
- The service code [C] is displayed on the LCD by the number of two digits. (The service code of the K-ACT ABS adds "B" at the left side of the code.)

○When pushing and holding the upper meter button while the warning massage and warning indicator are displayed alternately on the LCD, the display on the LCD is shifted to the previous display with the red warning indicator light (LED) goes on.

○After switching to the previous display, the service code can not be displayed even if pushing the upper meter button and lower meter button for more than two seconds.



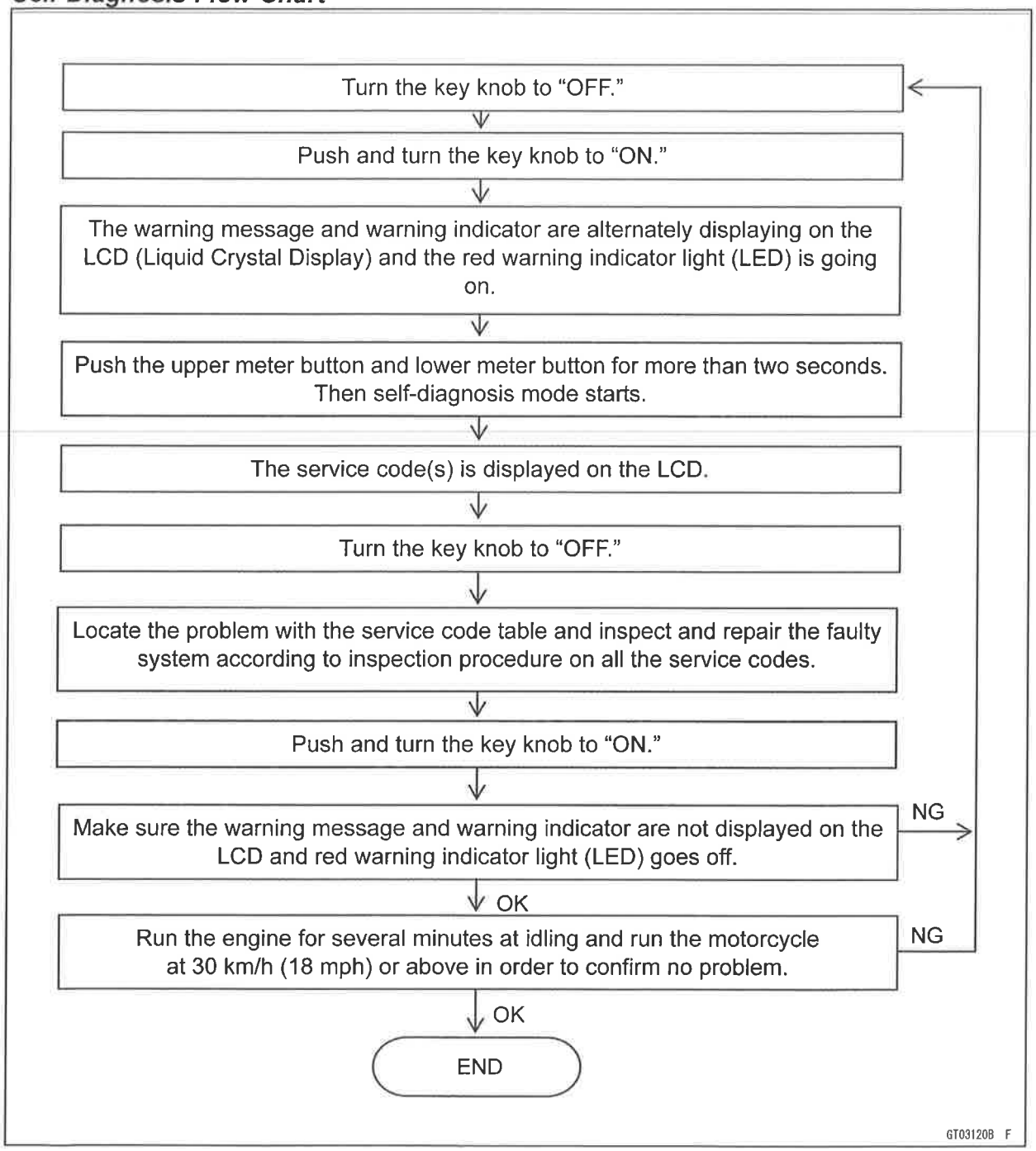
- Any of the following procedures ends self-diagnosis.

○When the service code is displayed on the LCD, push the upper meter button and lower meter button for more than two seconds. The display will return to the warning message and the warning indicator.

○When the key knob is turned "OFF."

Self-Diagnosis

Self-Diagnosis Flow Chart


Turn the key knob to "OFF."
Push and turn the key knob to "ON."
The warning message and warning indicator are alternately displaying on the LCD (Liquid Crystal Display) and the red warning indicator light (LED) is going on.
Push the upper meter button and lower meter button for more than two seconds. Then self-diagnosis mode starts.
The service code(s) is displayed on the LCD.
Turn the key knob to "OFF."
Locate the problem with the service code table and inspect and repair the faulty system according to inspection procedure on all the service codes.
Push and turn the key knob to "ON."
Make sure the warning message and warning indicator are not displayed on the LCD and red warning indicator light (LED) goes off.
NG
OK
Run the engine for several minutes at idling and run the motorcycle at 30 km/h (18 mph) or above in order to confirm no problem.
NG
OK
END
GT03120B F

Self-Diagnosis

Service Code Reading

○The service code(s) is displayed on the LCD by the number of two digits. (The service code of the K-ACT ABS adds "B" at the left side of the code.)

○For DFI System, KTRC System, Tire Pressure Sensor and KIPASS, when there are a number of problems, all the service codes can be stored and the display will begin starting from the lowest number service code in the numerical order.

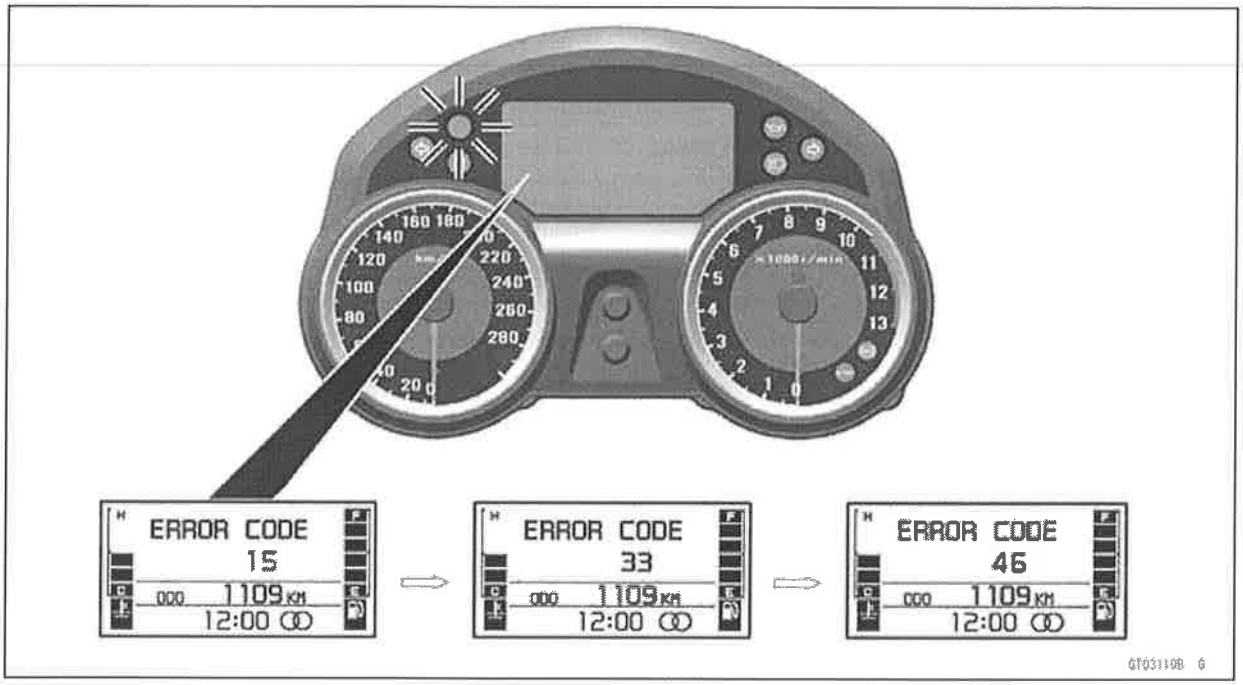
○For K-ACT ABS, the service codes display at random.

○Then after completing all codes, the display is repeated until the key knob is turned "OFF" or upper meter button and lower meter button are pushed for more than two seconds.

○The order of the system's appearing is the order of DFI System, KTRC System, Tire Pressure Sensor, KIPASS, and K-ACT ABS.

○For example, if three problems occurred in the order of 46, 15, 33, the service codes are displayed (each two seconds) from the lowest number in the order listed as shown below.

(15 → 33 → 46) → (15 → 33 → 46) → → ····· (repeated)



○In the case more than two service codes are available, you may push the upper meter button to shift into the other code too.

○If the no problem or when the repair has done, warning indicator light (LED) goes off and warning message, warning indicator and service code are not displayed.

○If the problem is with the following parts, the ECU can not memorize these problem, the red warning indicator light (LED) do not goes on or blinks and warning message and warning indicator are not displayed, and no service codes can be displayed.

Warning Indicator Light (LED)
Meter Panel LCD
Stick Coil Secondary Wiring and Ground Wiring (see Stick Coil Inspection in the Electrical System chapter)
ECU Power Source Wiring and Ground Wiring (see ECU Power Supply Inspection)

Self-Diagnosis

Service Code Erasing

○When repair has been done, warning indicator light (LED) goes off and warning message, warning indicator and service code are not displayed.

★But the service codes stored in memory of the ECU are not erased to preserve the problem history. In this model, the problem history can not be erased. However, the memories of the K-ACT ABS service codes can be erased using the Kawasaki Diagnostic System (KDS ver.3).

Service Codes	System	Problems
11	FI	Main throttle sensor malfunction, wiring open or short
12	FI	Intake air pressure sensor malfunction, wiring open or short
13	FI	Intake air temperature sensor malfunction, wiring open or short
14	FI	Water temperature sensor malfunction, wiring open or short
15	FI	Atmospheric pressure sensor malfunction, wiring open or short
21	FI	Crankshaft sensor malfunction, wiring open or short
23	FI	Exhaust camshaft position sensor malfunction, wiring open or short
24	FI	Speed sensor malfunction, wiring open or short
25	FI	Gear position switch malfunction, wiring open or short
26	FI	Intake camshaft position sensor malfunction, wiring open or short
27	KTRC	Front and/or rear wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing, wiring open)
31	FI	Vehicle-down sensor malfunction, wiring open or short
32	FI	Subthrottle sensor malfunction, wiring open or short
33	FI	Oxygen sensor #1 inactivation, wiring open or short
37	KIPASS	Steering lock unit communication error
38	KIPASS	ECU communication error
39	FI	KIPASS ECU communication error
46	FI	Fuel pump relay malfunction, relay is stuck
51	FI	Stick coil #1 malfunction, wiring open or short
52	FI	Stick coil #2 malfunction, wiring open or short
53	FI	Stick coil #3 malfunction, wiring open or short
54	FI	Stick coil #4 malfunction, wiring open or short
56	FI	Radiator fan relay malfunction, wiring open or short
59	FI	Variable valve timing abnormal
62	FI	Subthrottle valve actuator malfunction, wiring open or short
64	FI	Air switching valve malfunction, wiring open or short
65	FI	Oil control solenoid valve malfunction, wiring open or short
67	FI	Oxygen sensor heater #1 and/or #2 malfunction, wiring open or short
68	KIPASS	Steering lock unit malfunction, wiring open
83	FI	Oxygen sensor #2 inactivation, wiring open or short
89	KTRC	KTRC button malfunction, button is stuck or wiring short
1A	KTRC	Meter unit and K-ACT ABS hydraulic unit communication error
1B	KTRC/K-ACT ABS	K-ACT ABS hydraulic unit communication error
2C	KTRC	Ground wiring open (ECU terminal 23)
B 13	K-ACT ABS	Rear intake solenoid valve trouble (open, temperature abnormal)
B 14	K-ACT ABS	Rear outlet solenoid valve trouble (open, temperature abnormal)
B 17	K-ACT ABS	Front intake solenoid valve trouble (open, temperature abnormal)

Self-Diagnosis

Service Codes	System	Problems
B 18	K-ACT ABS	Front outlet solenoid valve trouble (open, temperature abnormal)
B 19	K-ACT ABS	K-ACT ABS solenoid valve relay trouble (wiring shorted or open, stuck relay (ON or OFF) or dropout)
B 21	K-ACT ABS	Front combine intake valve trouble (open, temperature abnormal)
B 22	K-ACT ABS	Front combine outlet valve trouble (open, temperature abnormal)
B 25	K-ACT ABS	Front, rear wheel rotation difference abnormal (substandard tire, sensor rotor teeth number wrong)
B 35	K-ACT ABS	K-ACT ABS motor relay trouble [wiring shorted or open, stuck relay (ON or OFF)]
B 42	K-ACT ABS	Front wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)
B 43	K-ACT ABS	Front wheel rotation sensor wiring (wiring shorted or open, connector bad connection)
B 44	K-ACT ABS	Rear wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)
B 45	K-ACT ABS	Rear wheel rotation sensor wiring (wiring shorted or open, connector bad connection)
B 52	K-ACT ABS	Power supply voltage abnormal (low-voltage)
B 53	K-ACT ABS	Power supply voltage abnormal (over-voltage)
B 54	K-ACT ABS	K-ACT ABS solenoid valve relay supply voltage (low voltage)
B 55	K-ACT ABS	ECU trouble (ECU operation abnormal)
B 57	K-ACT ABS	CAN bus monitor malfunction
B 58	K-ACT ABS	K-ACT ABS button signal CAN monitor malfunction
B 59	K-ACT ABS	K-ACT ABS button malfunction, short
B 71	K-ACT ABS	Rear high pressure switching valve trouble (open, temperature abnormal)
B 72	K-ACT ABS	Rear switching valve trouble (open, temperature abnormal)
B 73	K-ACT ABS	Front switching valve trouble (open, temperature abnormal)
B 74	K-ACT ABS	Front high pressure switching valve trouble (open, temperature abnormal)
B 81	K-ACT ABS	Input fluid pressure sensor (front brake) trouble (voltage abnormal, wiring shorted or open)
B 82	K-ACT ABS	Input fluid pressure sensor (front brake) trouble (offset abnormal)
B 83	K-ACT ABS	Output fluid pressure sensor (front brake) trouble (voltage abnormal, wiring shorted or open)
B 84	K-ACT ABS	Output fluid pressure sensor (front brake) trouble (offset abnormal)
B 85	K-ACT ABS	Input fluid pressure sensor (rear brake) trouble (voltage abnormal, wiring shorted or open)
B 86	K-ACT ABS	Input fluid pressure sensor (rear brake) trouble (offset abnormal)
B 87	K-ACT ABS	Output fluid pressure sensor (rear brake) trouble (voltage abnormal, wiring shorted or open)
B 88	K-ACT ABS	Output fluid pressure sensor (rear brake) trouble (offset abnormal)
B 89	K-ACT ABS	Fluid pressure sensor supply voltage abnormal
B 91	K-ACT ABS	Front fluid pressure sensor signal abnormal (sensor missing)
B 92	K-ACT ABS	Rear fluid pressure sensor signal abnormal (sensor missing)

Self-Diagnosis

Notes:

- OThe ECU may be involved in these problems. If all the parts and circuits checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.
- OWhen no service code is displayed, the electrical parts of the DFI system has no fault, and the mechanical parts of the DFI system and the engine are suspect.

Backups

- OThe ECU takes the following measures to prevent engine damage when the DFI, ignition, KTRC, KIPASS or immobilizer system parts have troubles.

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
11	Main Throttle Sensor	Output Voltage 0.2 ~ 4.8 V	If the main throttle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU locks ignition timing into the ignition timing at closed throttle position and sets the DFI in the D-J method (1).
12	Intake Air Pressure Sensor	Intake Air Pressure (Absolute) Pv = 0 ~ 950 mmHg	If the intake air pressure sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets the DFI in the α-N method (2).
13	Intake Air Temperature Sensor	Intake Air Temperature Ta = –30 ~ +100°C	If the intake air temperature sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Ta at 30°C.
14	Water Temperature Sensor	Water Temperature Tw = –30 ~ +120°C	If the water temperature sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Tw at 80°C and the radiator fan operates.
15	Atmospheric Pressure Sensor	Atmospheric Pressure (Absolute) Pa = 0 ~ 950 mmHg	If the atmospheric pressure sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Pa at 760 mmHg (the standard atmospheric pressure).
21	Crankshaft Sensor	Crankshaft sensor must send 22 signals to the ECU at the 1 cranking.	If the crankshaft sensor fails, the engine stops by itself.
23	Exhaust Camshaft Position Sensor	Exhaust camshaft position sensor must send 1 signal to the ECU at the 2 crankings.	If the exhaust camshaft position sensor system fails (the signal is missing, wiring short or open), the ECU continues to ignite cylinders in the same sequence following the last good signal. However, it can not be restarted after the engine was stopped once.
24	Speed Sensor	Speed sensor must send 22 signals to the ECU at the 1 rotation of the output shaft.	If the speed sensor system fails (no signal, wiring short or open), the speedometer shows 0.
25	Gear Position Switch	Output Voltage 0.2 ~ 4.8 V	If the gear position switch system fails (no signal, wiring short or open), the ECU set the top (6th) gear position.

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
26	Intake Camshaft Position Sensor	Intake camshaft position sensor must send 1 signal to the ECU at the 1 cranking.	If the intake camshaft position sensor system fails (the signal is missing, wiring short or open), the ECU stops the variable valve timing control, and it sets the ignition timing to the retardation mode.
27	Front and/or Rear Wheel Rotation Sensor Signal	Front and/or rear wheel rotation sensor must sends 48 signals (front) and 45 signals (rear) to the ECU at the 1 rotation of the wheels.	If the front and/or rear wheel rotation sensor system fails (the signal is missing, wiring open), the ECU stops the KTRC.
31	Vehicle -down Sensor	Output Voltage 0.2 ~ 4.8 V	If the vehicle-down sensor system has failures (the output voltage is out of the usable range, wiring short or open), the ECU shuts off the fuel pump relay, the fuel injectors and the ignition system.
32	Subthrottle Sensor	Output Voltage 0.2 ~ 4.8 V	If the subthrottle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU drive the subthrottle valve to the full closed position, and it stops the current to the subthrottle valve actuator.
33	Oxygen Sensor #1	The oxygen sensor #1 is active and sensor must send signals (output voltage) continuously to the ECU.	If the oxygen sensor #1 is not activated, the ECU stops the feedback mode of the oxygen sensor #1 and #2.
37	Steering Lock Unit	The steering lock unit sends the data to the KIPASS ECU through the CAN communication line.	–
38	ECU	The ECU sends the data to the KIPASS ECU through the CAN communication line.	–
39	KIPASS ECU	The KIPASS ECU sends the data to the meter unit through the CAN communication line.	–
46	Fuel Pump Relay	When the fuel pump relay is ON, battery monitor voltage is 5 V or more.	–
51	Stick Coil #1*	The stick coil primary winding must send signals (output voltage) continuously to the ECU.	If the stick coil #1 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #1 to stop fuel to the cylinder #1, though the engine keeps running.
52	Stick Coil #2*	The stick coil primary winding must send signals (output voltage) continuously to the ECU.	If the stick coil #2 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #2 to stop fuel to the cylinder #2, though the engine keeps running.

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
53	Stick Coil #3*	The stick coil primary winding must send signals (output voltage) continuously to the ECU.	If the stick coil #3 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #3 to stop fuel to the cylinder #3, though the engine keeps running.
54	Stick Coil #4*	The stick coil primary winding must send signals (output voltage) continuously to the ECU.	If the stick coil #4 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #4 to stop fuel to the cylinder #4, though the engine keeps running.
56	Radiator Fan Relay	When the radiator fan relay is OFF, the relay is opened.	–
59	Variable Valve Timing	Changes the valve timing by the signal from the intake camshaft position sensor.	If the variable valve timing is incorrect, the ECU drive the subthrottle valve to the full closed position, and it stops the current to the subthrottle valve actuator.
62	Subthrottle Valve Actuator	The actuator operates open and close of the subthrottle valve by the pulse signal from the ECU.	If the subthrottle valve actuator fails (the signal is out to the usable range, wiring short or open), the ECU stops the current to the actuator.
64	Air Switching Valve	The air switching valve controls the flow of the secondary air by opening and shutting the solenoid valve.	–
65	Oil Control Solenoid Valve	The oil control solenoid valve controls the variable valve timing by opening and shutting the solenoid valve.	If the oil control solenoid valve fails (wiring short or open), the variable valve timing is in the retarded position.
67	Oxygen Sensor Heater #1 and/or #2	The oxygen sensor heater #1 and/or #2 raise temperature of the sensor for its earlier activation.	If the oxygen sensor heater #1 and/or #2 fails (wiring short or open), the ECU stops the current to the heater, and it stops the feedback mode of the oxygen sensor #1 and #2.
68	Steering Lock Unit	–	If the steering lock unit fails (wiring open), the key knob can not be turned to ON.
83	Oxygen Sensor #2	The oxygen sensor #2 is active and sensor must send signals (output voltage) continuously to the ECU.	If the oxygen sensor #2 is not activated, the ECU stops feedback mode of the oxygen sensor #1 and #2.
89	KTRC Button	When the KTRC button is OFF, the button is opened.	If the KTRC button fails (wiring short), the ECU stops the KTRC.
1A	Meter Unit and K-ACT ABS Hydraulic Unit	The meter unit and K-ACT ABS hydraulic unit send the data (for KTRC control) to the ECU through the CAN communication line.	If the communication data is not sent, the ECU stops the KTRC.

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
1B	K-ACT ABS Hydraulic Unit	The K-ACT ABS hydraulic unit sends the data (for status of K-ACT ABS hydraulic unit) to the meter unit and ECU through the CAN communication line.	If the communication data is not sent, the ECU stops the KTRC.
2C	Ground Wiring (ECU Terminal 23)	The ground wiring (ECU terminal 23) is connected with the ground.	If the ground wiring is opened, the ECU stops the KTRC.

Note:

(1): D-J Method: When the engine load is light like at idling or low speed, the ECU determines the injection quantity by calculating from the throttle vacuum (vacuum sensor output voltage) and engine speed (crankshaft sensor output voltage). This method is called D-J method.

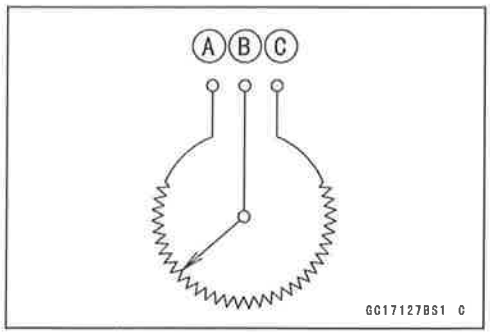
(2): α-N Method: As the engine speed increases, and the engine load turns middle to heavy, the ECU determines the injection quantity by calculating from the throttle opening (throttle sensor output voltage) and the engine speed. This method is called α-N method.

*: This depends on the number of stopped cylinders.

Main Throttle Sensor (Service Code 11)

The main throttle sensor is a rotating variable resistor that change output voltage according to throttle operating. The ECU senses this voltage change and determines fuel injection quantity, and ignition timing according to engine rpm, and throttle opening.

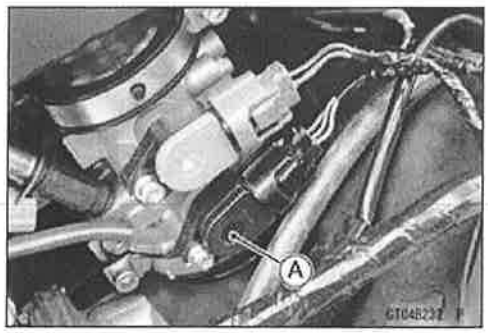
Input Terminal [A]: BL
Output Terminal [B]: Y/W
Ground Terminal [C]: BR/BK



Main Throttle Sensor Removal/Adjustment

NOTICE

Do not remove or adjust the main throttle sensor [A] since it has been adjusted and set with precision at the factory.
Never drop the throttle body assy especially on a hard surface. Such a shock to the main throttle sensor can damage it.

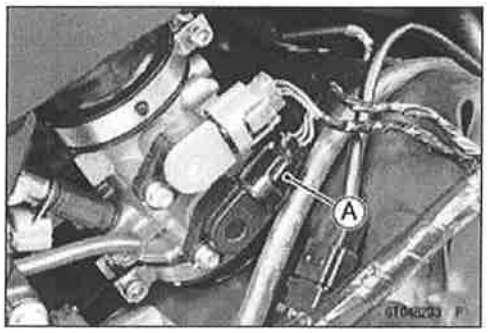


Main Throttle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the right subframe (see Right Subframe Removal in the Frame chapter).
- Disconnect the main throttle sensor connector [A].

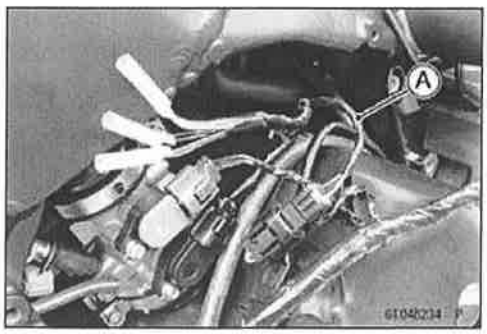


- Connect the setting adapter [A] between the harness connector and main throttle sensor connector.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

- Connect a digital meter to the setting adapter leads.

Main Throttle Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → W (sensor BL) lead
Digital Meter (–) → BK (sensor BR/BK) lead



- Measure the input voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the key knob to "OFF."

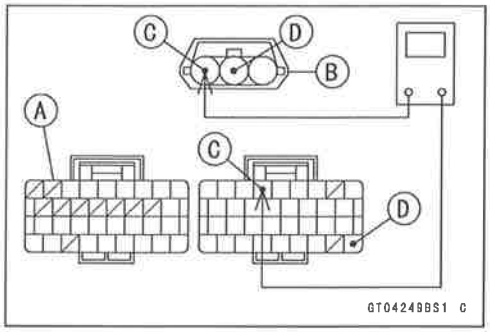
★If the reading is within the standard, check the output voltage (see Main Throttle Sensor Output Voltage Inspection).

Main Throttle Sensor (Service Code 11)

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Main Throttle Sensor Connector [B]
BL lead (ECU terminal 40) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

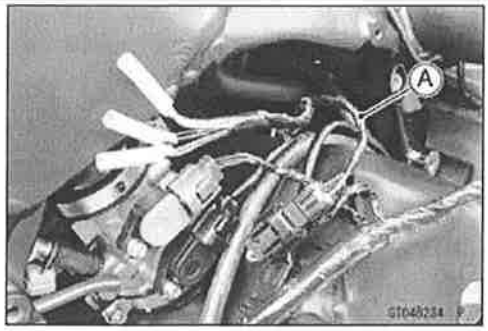
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Main Throttle Sensor Output Voltage Inspection

• Measure the output voltage at the main throttle sensor in the same way as input voltage inspection, note the following.

○Disconnect the main throttle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



Main Throttle Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor Y/W) lead
Digital Meter (–) → BK (sensor BR/BK) lead

• Start the engine and warm it up thoroughly.

• Check the idle speed to ensure the throttle opening is correct (see Idle Speed Inspection in the Periodic Maintenance chapter).

Idle Speed
Standard: 1 100 ±50 r/min (rpm)

Main Throttle Sensor (Service Code 11)

- Turn the key knob to "OFF."
- Measure the output voltage with the engine stopped, and with the connector joined.
- Push and turn the key knob to "ON."

Output Voltage
Standard: DC 0.52 ~ 0.72 V at idle throttle opening
DC 3.90 ~ 4.10 V at full throttle opening (for reference)

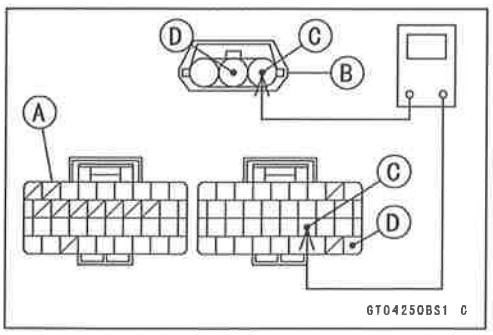
NOTE

○*Open the throttle, confirm the output voltage will be raise.*
○*The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.*
○*When the input voltage reading shows other than 5 V, derive a voltage range as follows.*
Example:
In the case of a input voltage of 4.75 V.
0.52 × 4.75 ÷ 5.00 = 0.49 V
0.72 × 4.75 ÷ 5.00 = 0.68 V
Thus, the valid range is 0.49 ~ 0.68 V

- Turn the key knob to "OFF."

★If the reading is out of the standard, check the main throttle sensor resistance (see Main Throttle Sensor Resistance Inspection).

★If the reading is within the standard, remove the ECU and check the wiring for continuity between harness connectors.
○Disconnect the ECU and sensor connectors.

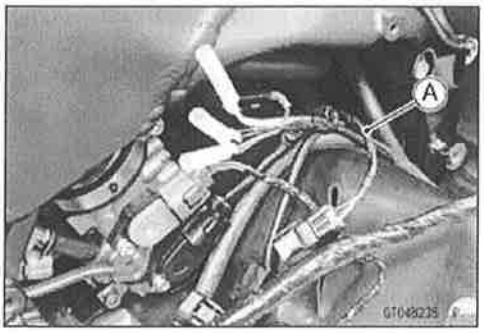


Wiring Continuity Inspection
ECU Connector [A] ←→
Main Throttle Sensor Connector [B]
Y/W lead (ECU terminal 54) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Main Throttle Sensor (Service Code 11)

Main Throttle Sensor Resistance Inspection



- Turn the key knob to "OFF."
- Disconnect the main throttle sensor connector.
- Connect the setting adapter [A] to the sensor connector only.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

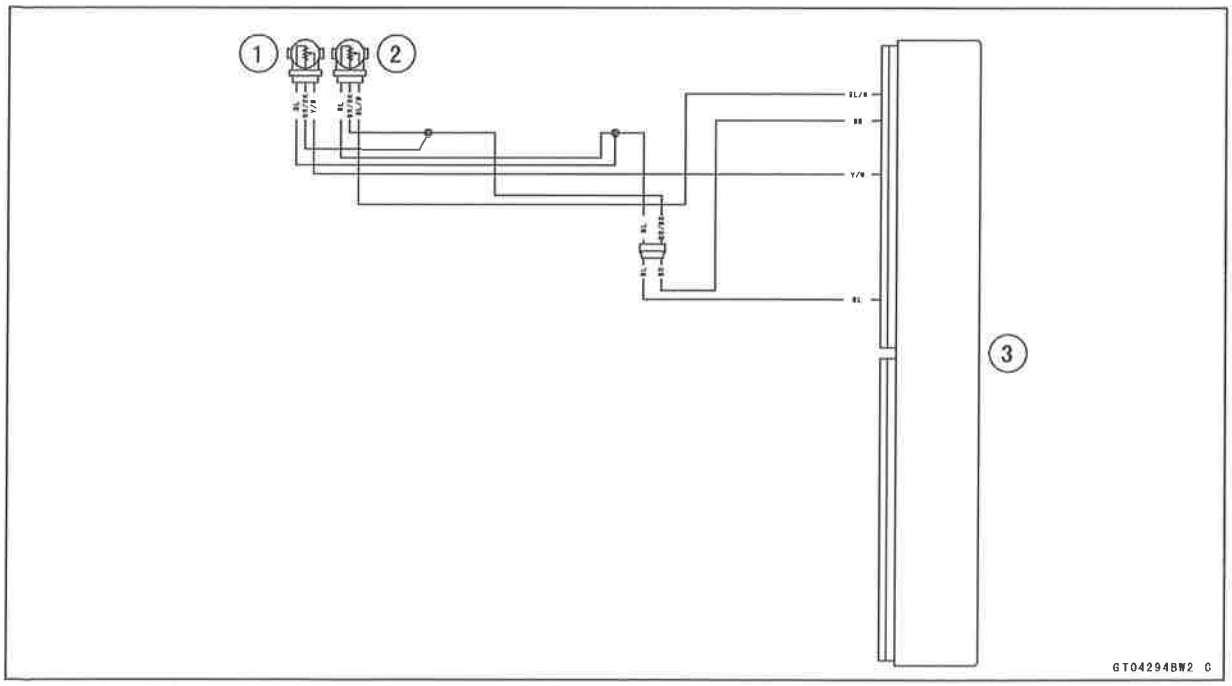
- Measure the main throttle sensor resistance.

Main Throttle Sensor Resistance
Connections to Adapter:
W (sensor BL) lead ←→ BK (sensor BR/BK) lead
Standard: 4 ~ 6 kΩ

★If the reading is out of the standard, replace the throttle body assy.

★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

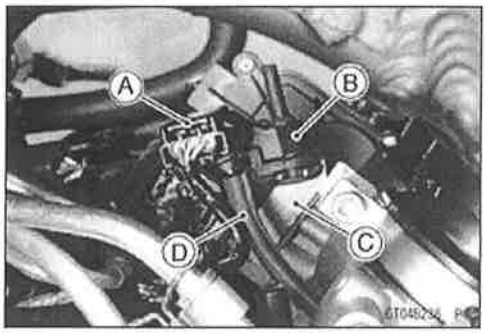
Main Throttle Sensor Circuit



1. Main Throttle Sensor
2. Subthrottle Sensor
3. ECU

Intake Air Pressure Sensor (Service Code 12)

Intake Air Pressure Sensor Removal

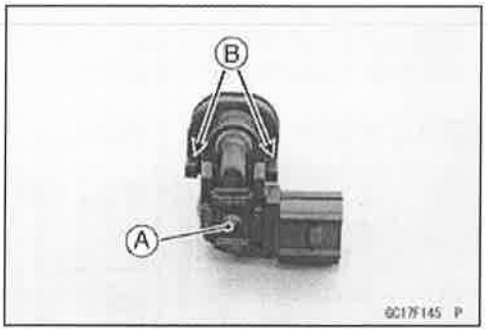


NOTICE

Never drop the intake air pressure sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Remove:
  Left Subframe (see Left Subframe Removal in the Frame chapter)
  Intake Air Pressure Sensor Connector [A]
- Remove the intake air pressure sensor [B] from the bracket [C].
- Disconnect the vacuum hose [D].
- Remove the rubber damper from the intake air pressure sensor.

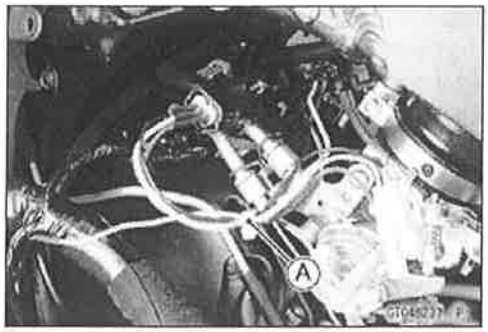
Intake Air Pressure Sensor Installation



- Installation is the reverse of removal.
- Position the intake air pressure sensor [A] between the projections [B] on the rubber damper.

Intake Air Pressure Sensor (Service Code 12)

Intake Air Pressure Sensor Input Voltage Inspection



NOTE

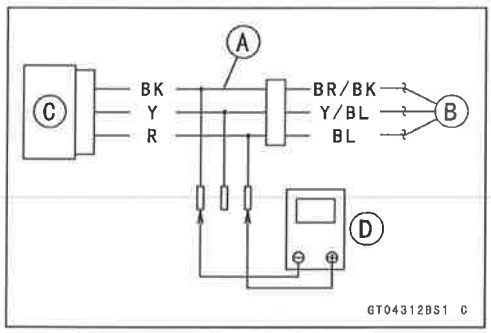
○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the left subframe (see Left Subframe Removal in the Frame chapter).
- Disconnect the intake air pressure sensor connector and connect the measuring adapter [A] between these connectors.

  Throttle Body Subharness [B]
  Intake Air Pressure Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.



Intake Air Pressure Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL) lead
Digital Meter (–) → BK (sensor BR/BK) lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

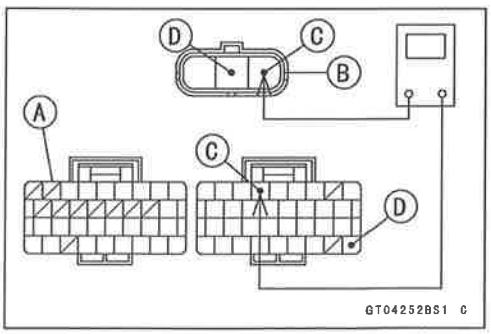
Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the key knob to "OFF."

★If the reading is within the standard, check the output voltage (see Intake Air Pressure Sensor Output Voltage Inspection).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.



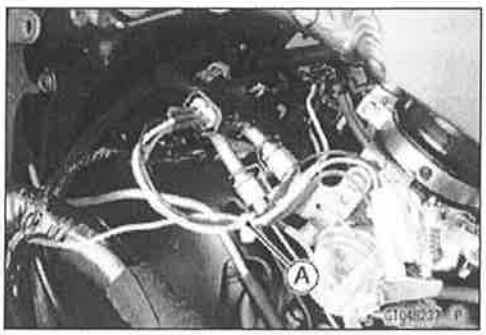
Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor Connector [B]
BL lead (ECU terminal 40) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]

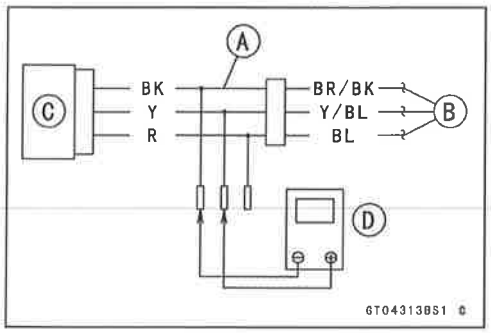
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Intake Air Pressure Sensor (Service Code 12)

Intake Air Pressure Sensor Output Voltage Inspection





- Measure the output voltage at the intake air pressure sensor in the same way as input voltage inspection, note the following.

○Disconnect the intake air pressure sensor connector and connect the measuring adapter [A] between these connectors.
Throttle Body Subharness [B]
Intake Air Pressure Sensor [C]
Digital Meter [D]

Special Tool - Measuring Adapter: 57001-1700

Intake Air Pressure Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → Y (sensor Y/BL) lead
Digital Meter (–) → BK (sensor BR/BK) lead

- Measure the output voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Output Voltage
Usable Range: **DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg)**

NOTE

○*The output voltage changes according to local atmospheric pressure.*

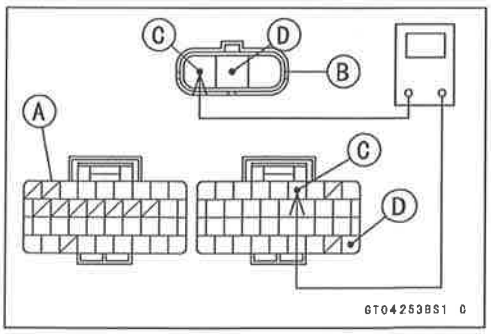
- Turn the key knob to "OFF."

★If the reading is out of the usable range, replace the sensor.

★If the reading is within the usable range, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor Connector [B]
Y/BL lead (ECU terminal 38) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]



Intake Air Pressure Sensor (Service Code 12)

★If the wiring is good, check the sensor for various vacuum.
- Remove the intake air pressure sensor [A] and disconnect the vacuum hose from the sensor.
- Connect an auxiliary hose [B] to the intake air pressure sensor.
- Temporarily install the intake air pressure sensor.
- Connect a digital meter [C], vacuum gauge [D], the fork oil level gauge [E] and the measuring adapter to the intake air pressure sensor.

Special Tools - Fork Oil Level Gauge: 57001-1290
Vacuum Gauge: 57001-1369
Measuring Adapter: 57001-1700

Intake Air Pressure Sensor Output Voltage Connections to Adapter:
Digital Meter (+) → Y (sensor Y/BL) lead
Digital Meter (–) → BK (sensor BR/BK) lead

- Push and turn the key knob to "ON."
- Measure the intake air pressure sensor output voltage from various vacuum readings, while pulling the handle of the fork oil level gauge.
- Check the intake air pressure sensor output voltage, using the following formula and chart.

Suppose:
Pg: Vacuum Pressure (Gauge) of Throttle Body
Pl: Local Atmospheric Pressure (Absolute) measured by a barometer
Pv: Vacuum Pressure (Absolute) of Throttle Body
Vv: Sensor Output Voltage (V)

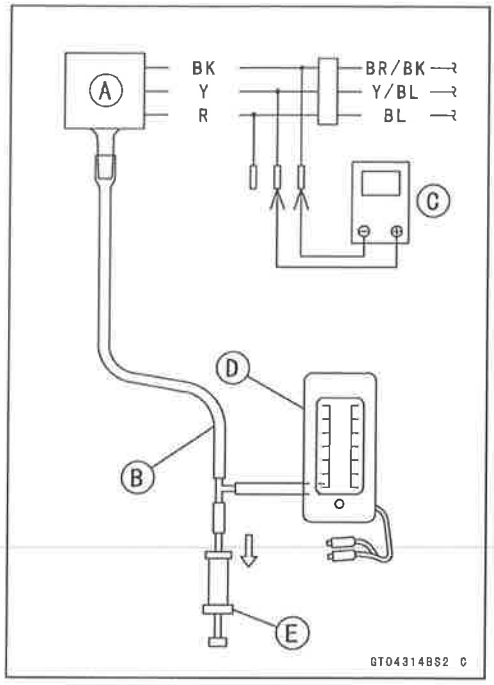
then
Pv = Pl + Pg

For example, suppose the following data is obtained:
Pg = –8 cmHg (Vacuum Gauge Reading)
Pl = 70 cmHg (Barometer Reading)
Vv = 3.2 V (Digital Meter Reading)

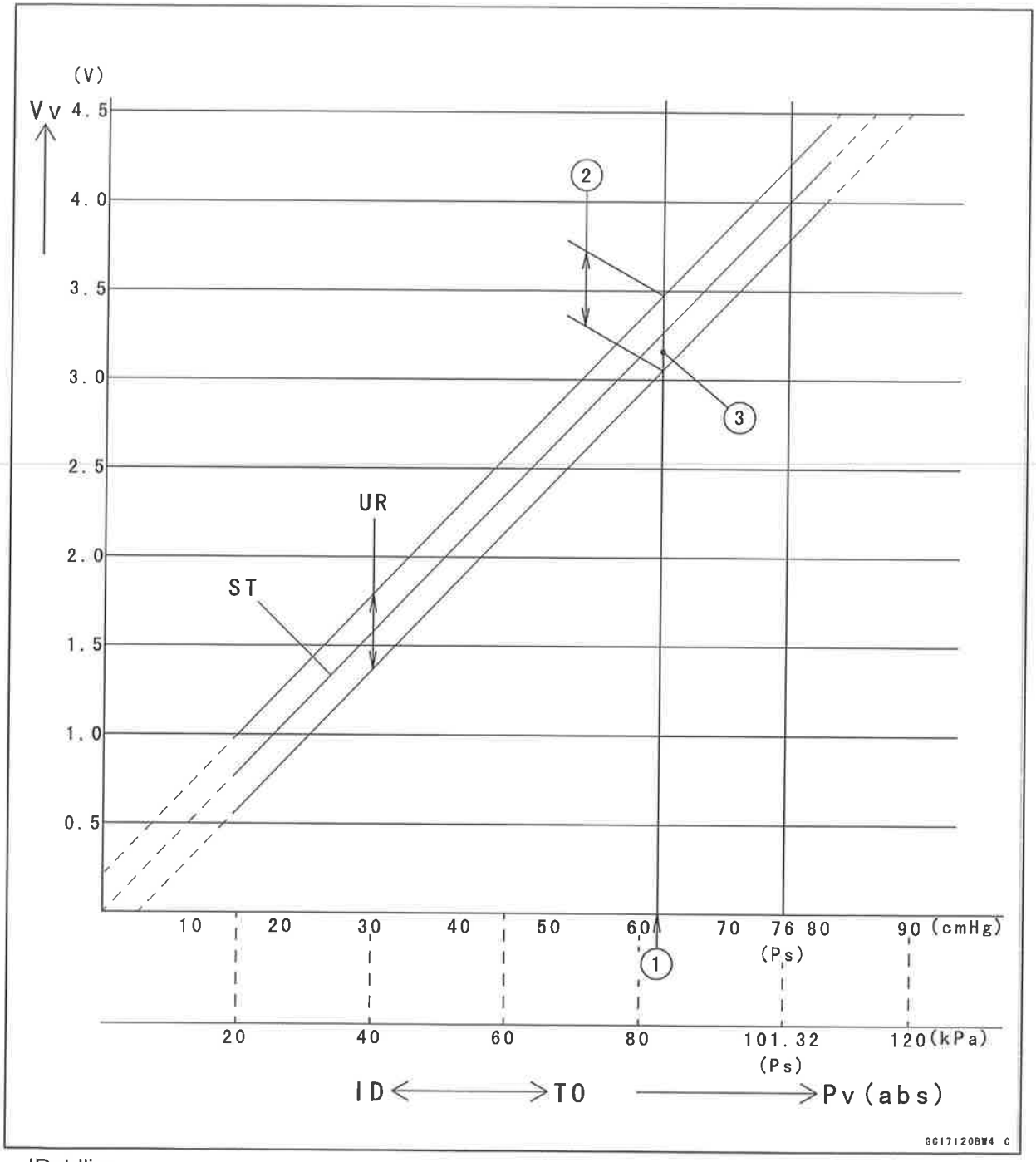
then
Pv = 70 + (–8) = 62 cmHg (Absolute)

Plot this Pv (62 cmHg) at a point [1] on the chart and draw a vertical line through the point. Then, you can get the usable range [2] of the sensor output voltage.
Usable range = 3.08 ~ 3.48 V
Plot Vv (3.2 V) on the vertical line. → Point [3].
Results: In the chart, Vv is within the usable range and the sensor is normal.

★If the reading is out of the usable range, replace the sensor.
★If the reading is within the usable range, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).



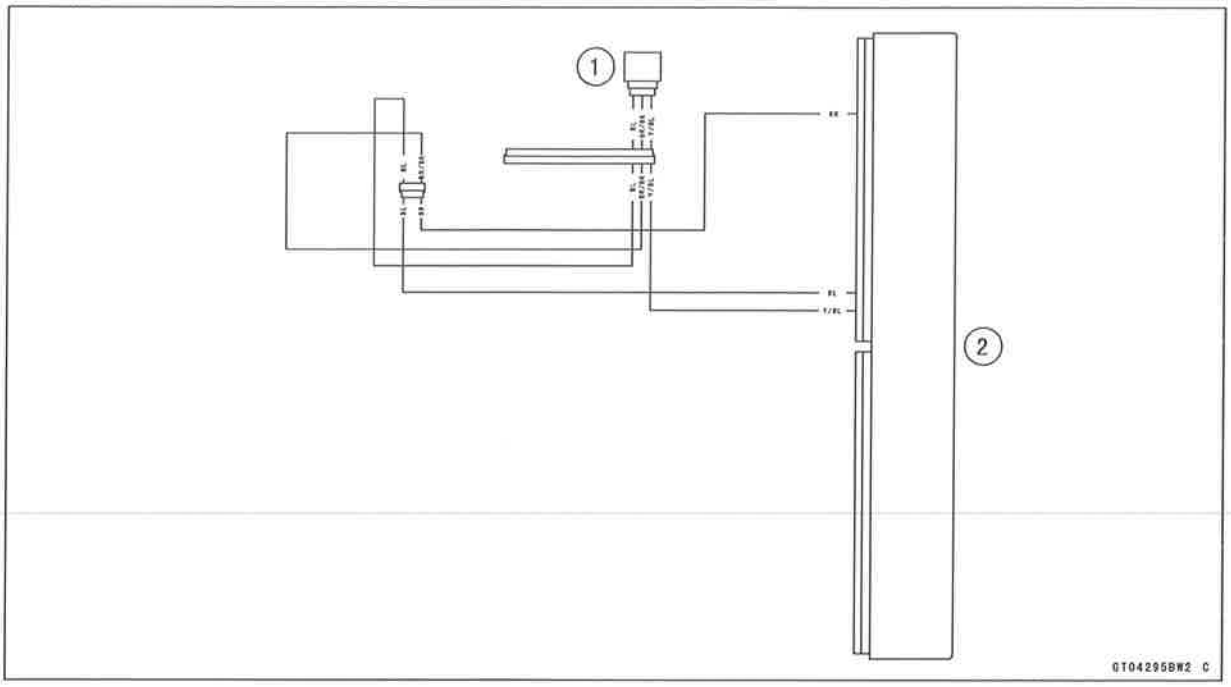
Intake Air Pressure Sensor (Service Code 12)



ID: Idling
Ps: Standard Atmospheric Pressure (Absolute)
Pv: Throttle Vacuum Pressure (Absolute)
ST: Standard of Sensor Output Voltage (V)
TO: Throttle Full Open
UR: Usable Range of Sensor Output Voltage (V)
Vv: Intake Air Pressure Sensor Output Voltage (V) (Digital Meter Reading)

Intake Air Pressure Sensor (Service Code 12)

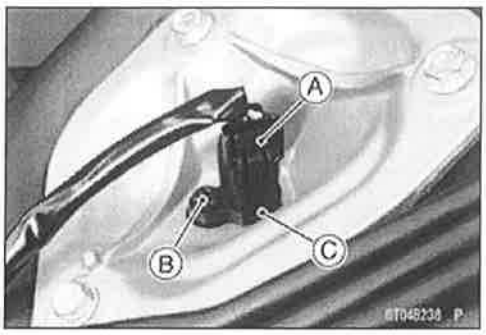
Intake Air Pressure Sensor Circuit



1. Intake Air Pressure Sensor
2. ECU

Intake Air Temperature Sensor (Service Code 13)

Intake Air Temperature Sensor Removal

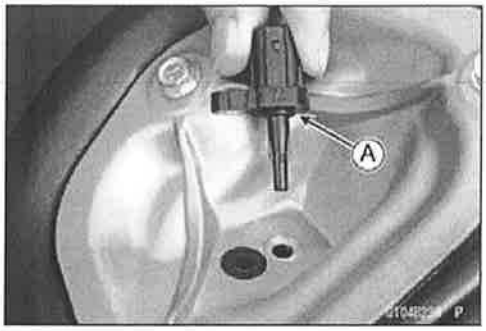


NOTICE

Never drop the intake air temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the intake air temperature sensor connector [A].
- Remove:
  Intake Air Temperature Sensor Screw [B]
  Intake Air Temperature Sensor [C]

Intake Air Temperature Sensor Installation

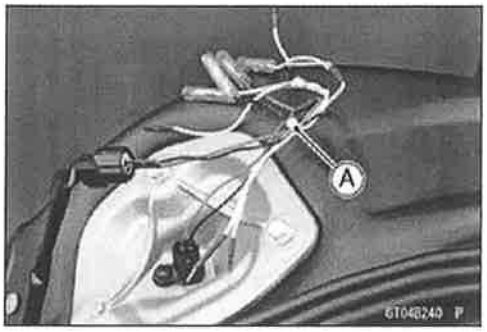


- Be sure to install the O-ring [A].
- Install the intake air temperature sensor.
- Tighten:

Torque - Intake Air Temperature Sensor Screw: 0.50 N·m (0.05 kgf·m, 4.4 in·lb)

- Install the removed parts (see appropriate chapters).

Intake Air Temperature Sensor Output Voltage Inspection

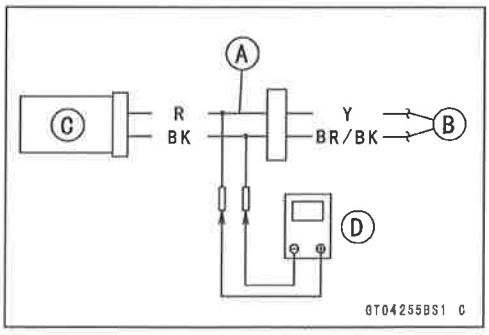


NOTE

○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the intake air temperature sensor connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Intake Air Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



- Connect a digital meter [D] to the measuring adapter leads.

Intake Air Temperature Sensor Output Voltage Connections to Adapter:

Digital Meter (+) → R (sensor Y) lead

Digital Meter (–) → BK (sensor BR/BK) lead

- Measure the output voltage with the engine stopped and the connector joined.
- Push and turn the key knob to "ON."

Output Voltage

Standard: About DC 2.25 ~ 2.50 V @20°C (68°F)

NOTE

○*The output voltage changes according to the intake air temperature.*

Intake Air Temperature Sensor (Service Code 13)

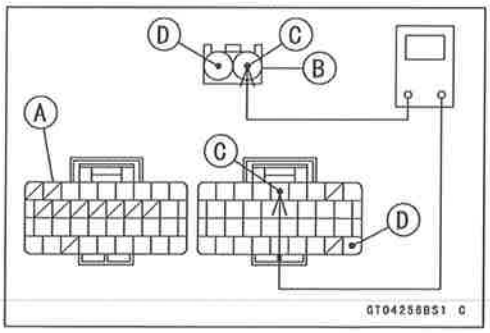
- Turn the key knob to "OFF."

★If the reading is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

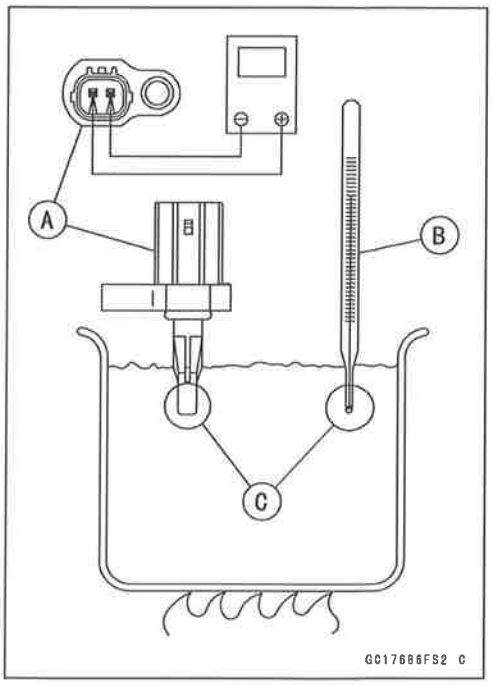


Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Temperature Sensor Connector [B]
Y lead (ECU terminal 39) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]

★If the wiring is good, check the intake air temperature sensor resistance (see Intake Air Temperature Sensor Resistance Inspection).

Intake Air Temperature Sensor Resistance Inspection

- Remove the intake air temperature sensor (see Intake Air Temperature Sensor Removal).
- Suspend the sensor [A] in a container of machine oil so that the heat-sensitive portion is submerged.
- Suspend a thermometer [B] with the heat-sensitive portion [C] located in almost the same depth with the sensor.



NOTE

○*The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the oil while stirring the oil gently for even temperature.
- Using a digital meter, measure the internal resistance of the sensor across the terminals at the temperatures shown in the following.

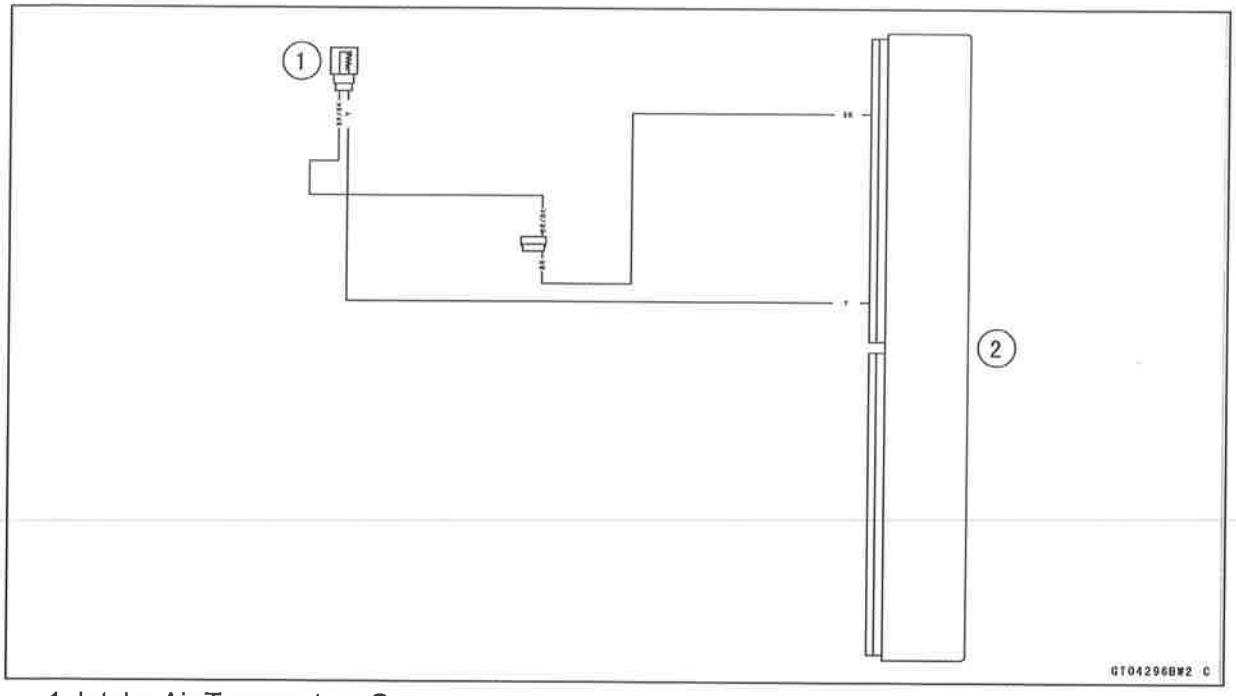
Intake Air Temperature Sensor Resistance
Standard: 5.4 ~ 6.6 kΩ @0°C (32°F)
0.29 ~ 0.39 kΩ @80°C (176°F)

★If the reading is out of the standard, replace the sensor.

★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Intake Air Temperature Sensor (Service Code 13)

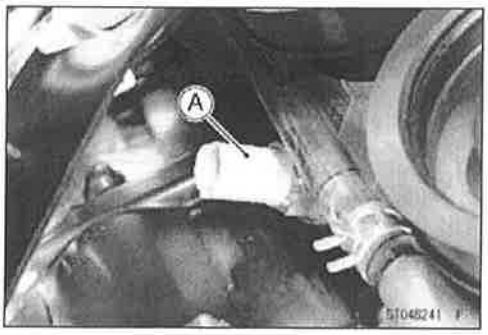
Intake Air Temperature Sensor Circuit



1. Intake Air Temperature Sensor
2. ECU

Water Temperature Sensor (Service Code 14)

Water Temperature Sensor Removal/Installation



NOTICE

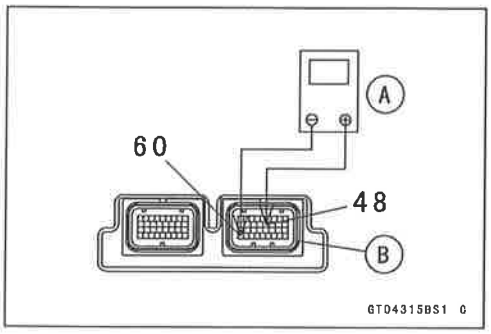
Never drop the water temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Remove the throttle body assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Water Temperature Sensor [A] with O-ring
- Replace the O-ring with a new one.
- Tighten:

Torque - Water Temperature Sensor: 12 N·m (1.2 kgf·m, 106 in·lb)

- Fill the engine with coolant and bleed the air from the cooling system (see Coolant Change in the Periodic Maintenance chapter).

Water Temperature Sensor Output Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the ECU (see ECU Removal in the Fuel System (DFI) chapter).

○Do not disconnect the ECU connectors.

- Connect a digital meter [A] to the connector [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

Water Temperature Sensor Output Voltage
Connections to ECU Connector:
Digital Meter (+) → O lead (ECU terminal 48)
Digital Meter (–) → BR lead (ECU terminal 60)

- Measure the output voltage with the engine stopped and the connector joined.
- Push and turn the key knob to "ON."

Output Voltage
Standard: About DC 2.80 ~ 2.97 V @20°C (68°F)

NOTE

○*The output voltage changes according to the coolant temperature in the engine.*

- Turn the key knob to "OFF."

★If the reading is within the standard, check the ECU for its ground, and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

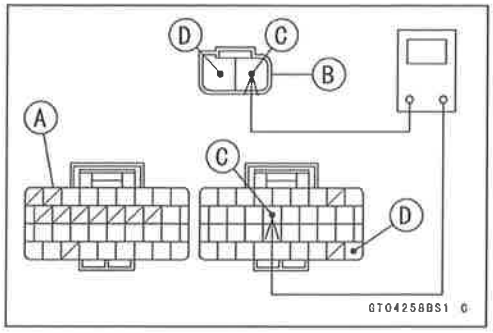
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Water Temperature Sensor (Service Code 14)

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Water Temperature Sensor Connector [B]
O lead (ECU terminal 48) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]



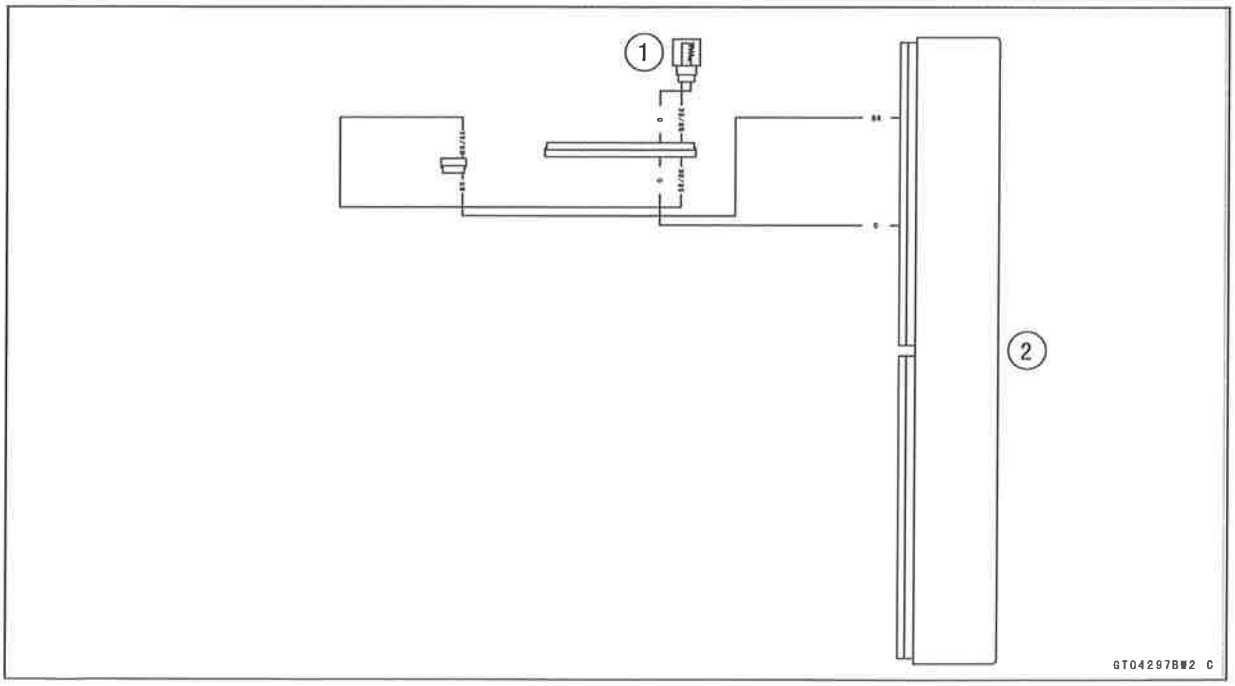
★If the wiring is good, check the water temperature sensor resistance (see Water Temperature Sensor Resistance Inspection).

Water Temperature Sensor Resistance Inspection

● Refer to the Water Temperature Sensor Inspection in the Electrical System chapter.

★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

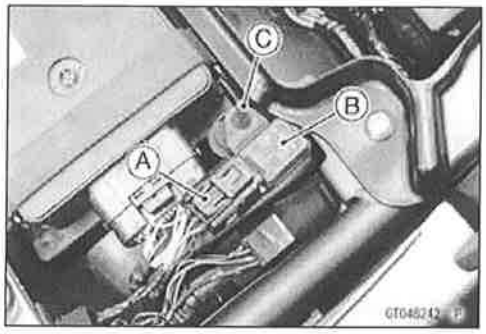
Water Temperature Sensor Circuit



1. Water Temperature Sensor
2. ECU

Atmospheric Pressure Sensor (Service Code 15)

Atmospheric Pressure Sensor Removal



NOTICE

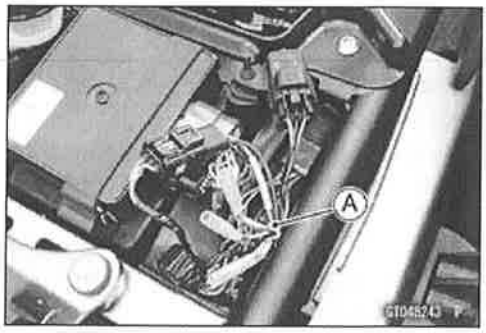
Never drop the atmospheric pressure sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Remove the seat (see Seat Removal in the Frame chapter).
- Disconnect the sensor connector [A].
- Remove the atmospheric pressure sensor [B] from the rubber damper [C] in the rear fender.

Atmospheric Pressure Sensor Installation

- Installation is the reverse of removal.

Atmospheric Pressure Sensor Input Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the seat (see Seat Removal in the Frame chapter).
- Disconnect the atmospheric pressure sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Sensor Harness Adapter: 57001-1561

- Connect a digital meter to the harness adapter leads.

Atmospheric Pressure Sensor Input Voltage
Connections to Adapter:

Digital Meter (+) → G/W (sensor BL) lead

Digital Meter (–) → BK (sensor BR/BK) lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the key knob to "OFF."

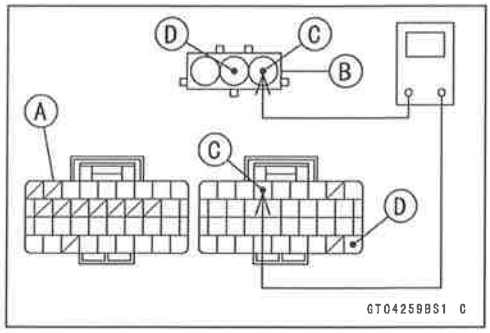
★If the reading is within the standard, check the output voltage (see Atmospheric Pressure Sensor Output Voltage Inspection).

Atmospheric Pressure Sensor (Service Code 15)

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Atmospheric Pressure Sensor Connector [B]
BL lead (ECU terminal 40) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

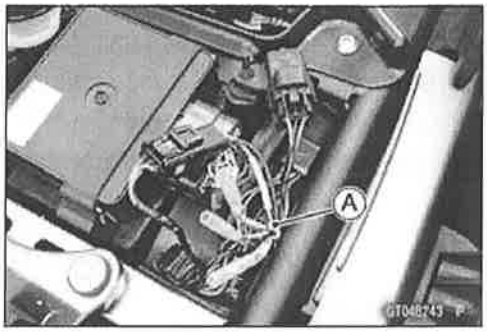
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Atmospheric Pressure Sensor Output Voltage Inspection

- Measure the output voltage at the atmospheric pressure sensor in the same way as input voltage inspection, note the following.

○Disconnect the atmospheric pressure sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Sensor Harness Adapter: 57001-1561



Atmospheric Pressure Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → G (sensor G/W) lead
Digital Meter (–) → BK (sensor BR/BK) lead

- Measure the output voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Output Voltage
Usable Range: DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg)

NOTE

○*The output voltage changes according to the local atmospheric pressure.*

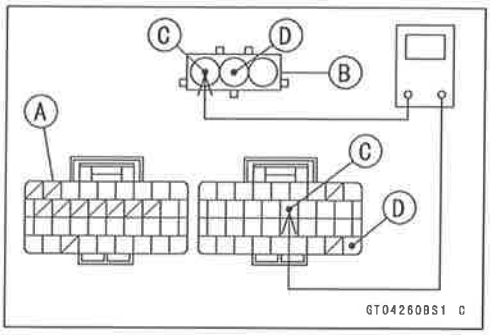
- Turn the key knob to "OFF."

★If the reading is out of the usable range, replace the sensor.

Atmospheric Pressure Sensor (Service Code 15)

★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.
○Disconnect the ECU and sensor connectors.

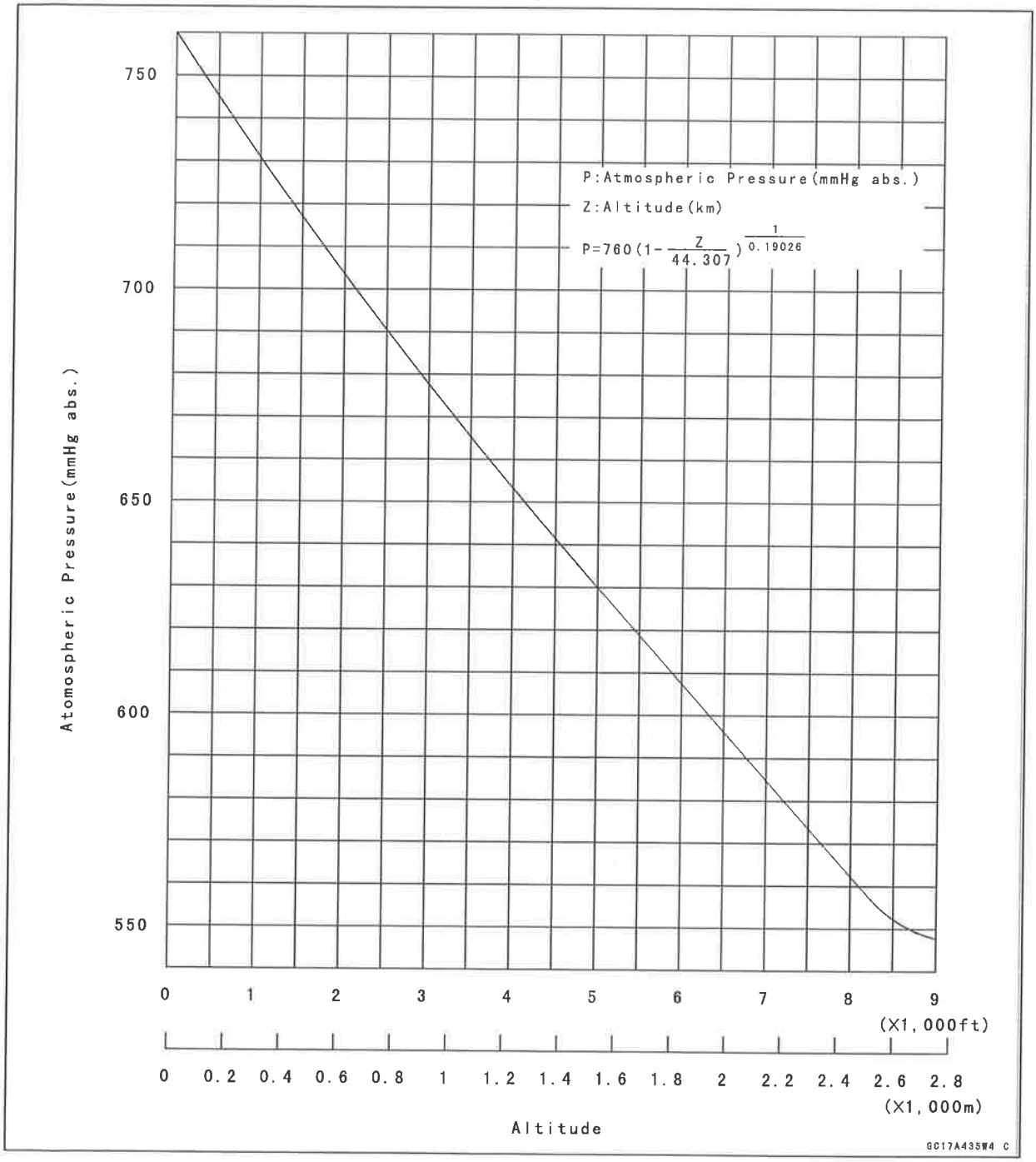
Wiring Continuity Inspection
ECU Connector [A] ←→
Atmospheric Pressure Sensor Connector [B]
G/W lead (ECU terminal 47) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]



★If the wiring is good, check the sensor for various vacuum.
○Determine the local altitude (elevation).
★If you know the local altitude, use the chart in this section.
★If you know the local atmospheric pressure using a barometer, substitute the atmospheric pressure for Pv (vacuum pressure) in the intake air pressure sensor chart (see Intake Air Pressure Sensor Output Voltage Inspection).
○Get the usable range of the atmospheric pressure sensor output voltage in the same way as Output Voltage Inspection of the intake air pressure sensor and check if Va (output voltage) is within the usable range or not.
★If the reading is out of the usable range, replace the sensor.
★If the reading is within the usable range, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

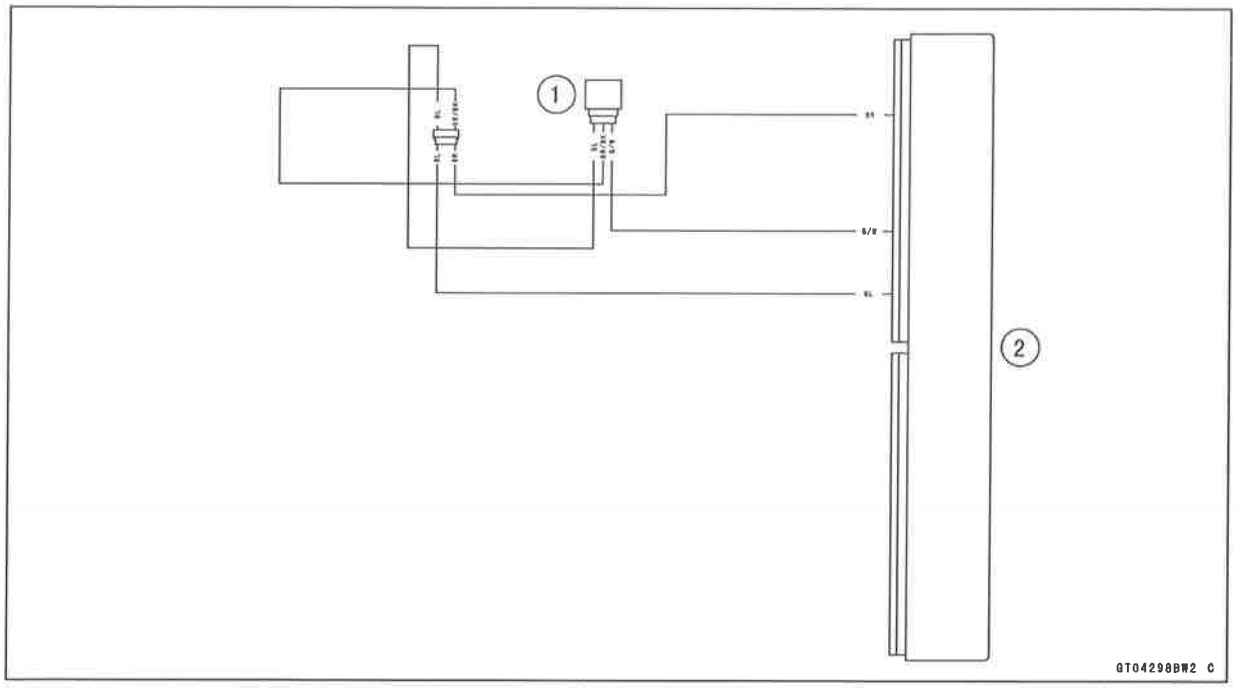
Atmospheric Pressure Sensor (Service Code 15)

Atmospheric Pressure/Altitude Relationship



Atmospheric Pressure Sensor (Service Code 15)

Atmospheric Pressure Sensor Circuit



1. Atmospheric Pressure Sensor
2. ECU

Crankshaft Sensor (Service Code 21)

The crankshaft sensor has no power source, and when the engine stops, the crankshaft sensor generates no signals.

Crankshaft Sensor Removal/Installation

- Refer to the Crankshaft Sensor Removal/Installation in the Electrical System chapter.

Crankshaft Sensor Resistance Inspection

- Refer to the Crankshaft Sensor Inspection in the Electrical System chapter.

★If the reading is within the standard, check the peak voltage (see Crankshaft Sensor Peak Voltage Inspection).

Crankshaft Sensor Peak Voltage Inspection

- Refer to the Crankshaft Sensor Peak Voltage Inspection in the Electrical System chapter.

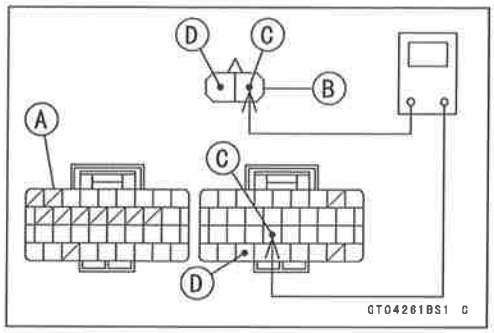
★If the reading is within the standard, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

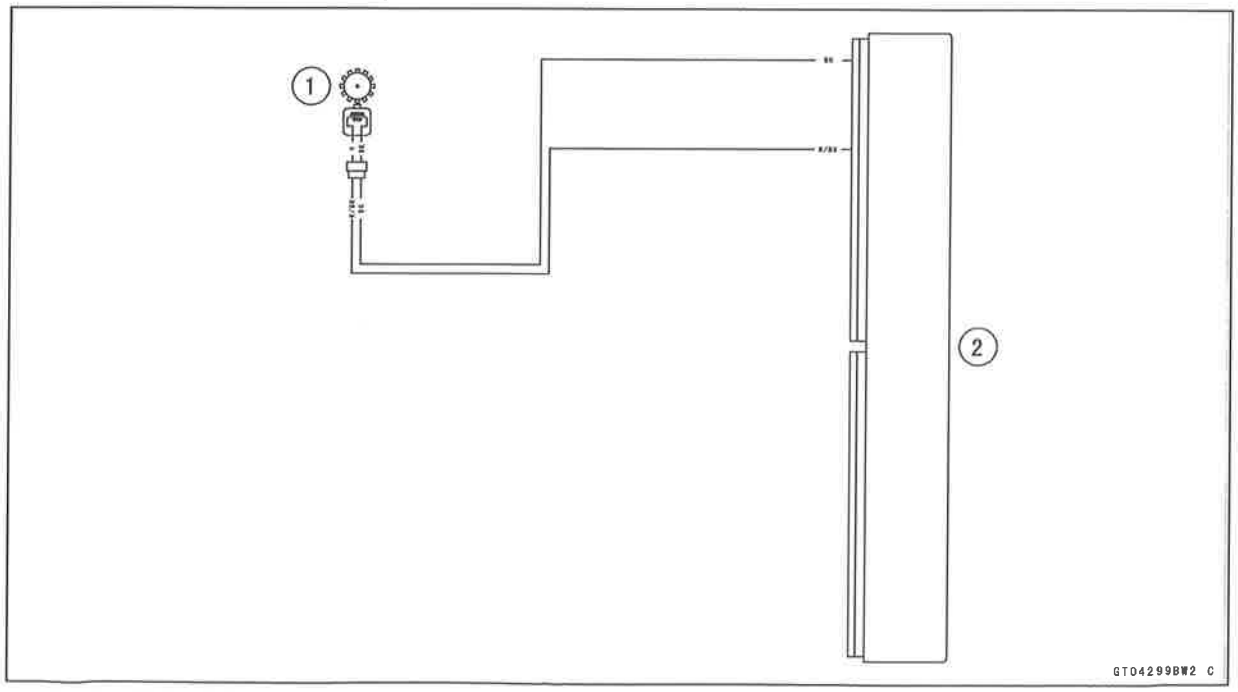
Wiring Continuity Inspection
ECU Connector [A] ←→
Crankshaft Sensor Connector [B]
R/BK lead (ECU terminal 56) [C]
BK lead (ECU terminal 66) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).



Crankshaft Sensor Circuit



1. Crankshaft Sensor
2. ECU

Camshaft Position Sensor (Service Code 23, 26)

Exhaust Camshaft Position Sensor: Service Code 23
Intake Camshaft Position Sensor: Service Code 26

The camshaft position sensor detects the position of the camshaft, and distinguishes the cylinder.

The camshaft position sensor has no power source, and when the engine stops, the camshaft position sensor generates no signals.

Camshaft Position Sensor Removal/Installation

- Refer to the Camshaft Position Sensor Removal/Installation in the Electrical System chapter.

Camshaft Position Sensor Resistance Inspection

- Refer to the Camshaft Position Sensor Inspection in the Electrical System chapter.

★If the reading is within the standard, check the peak voltage (see Camshaft Position Sensor Peak Voltage Inspection).

Camshaft Position Sensor Peak Voltage Inspection

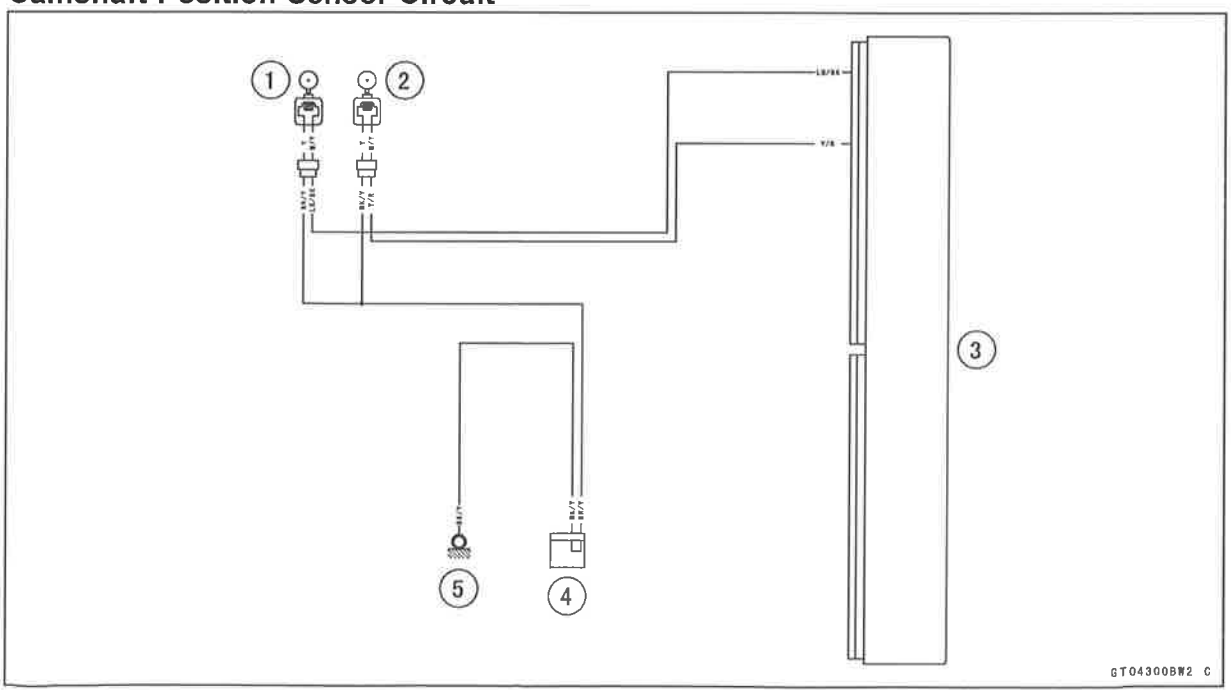
- Refer to the Camshaft Position Sensor Peak Voltage Inspection in the Electrical System chapter.

★If the reading is within the standard, check the wiring for continuity (see Camshaft Position Sensor Circuit).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Camshaft Position Sensor Circuit



1. Exhaust Camshaft Position Sensor
2. Intake Camshaft Position Sensor
3. ECU
4. Joint Connector 8
5. Frame Ground

Speed Sensor (Service Code 24)

Speed Sensor Removal/Installation

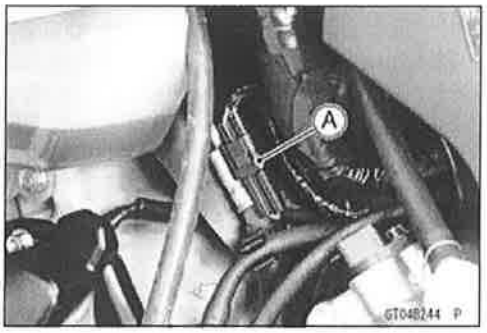
- Refer to the Speed Sensor Removal/Installation in the Electrical System chapter.

Speed Sensor Input Voltage Inspection

NOTE

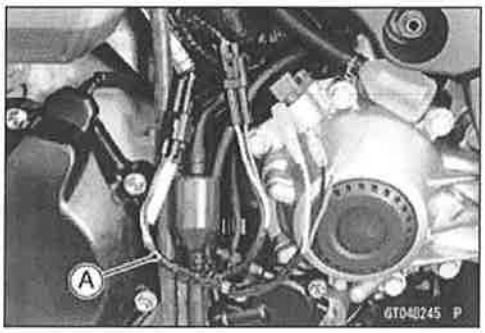
○*Be sure the battery is fully charged.*

- Turn the key nob to "OFF."
- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the speed sensor lead connector [A].



- Connect the setting adapter [A] between the main harness connector and speed sensor lead connector.

Special Tool - Throttle Sensor Setting Adapter #1: 57001 -1400



- Connect a digital meter to the setting adapter leads.

Speed Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → Y/W (sensor O/R) lead
Digital Meter (–) → BK/BL (sensor BK/W) lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Input Voltage
Standard: About DC 9 ~ 11 V

- Turn the key knob to "OFF."

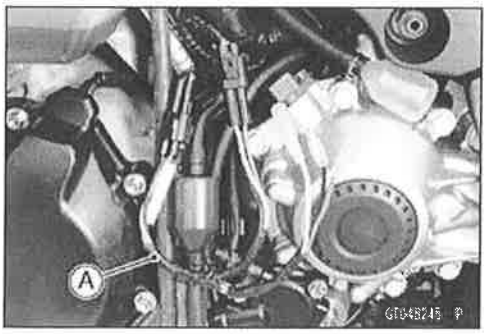
★If the reading is within the standard, check the output voltage (see Speed Sensor Output Voltage Inspection).

★If the reading is out of the standard, check the wiring for continuity (see Speed Sensor Circuit).

★If the wiring is good, check the meter unit for speed sensor supply voltage (see Meter System Inspection in the Electrical System chapter).

Speed Sensor (Service Code 24)

Speed Sensor Output Voltage Inspection



- Using the center stand, raise the rear wheel off the ground.
- Measure the output voltage at the speed sensor in the same way as input voltage inspection, note the following.

○Disconnect the speed sensor lead connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter #1: 57001 -1400

Speed Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → BL (sensor P) lead
Digital Meter (–) → BK/BL (sensor BK/W) lead

- Measure the output voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Output Voltage
Standard: About DC 0.6 V or less, or 4.8 V or more at ignition switch ON and 0 km/h

NOTE

○*Rotate the rear wheel by hand, confirm the output voltage will be raise or lower.*

- Turn the key knob to "OFF."

★If the reading is out of the standard, replace the sensor.

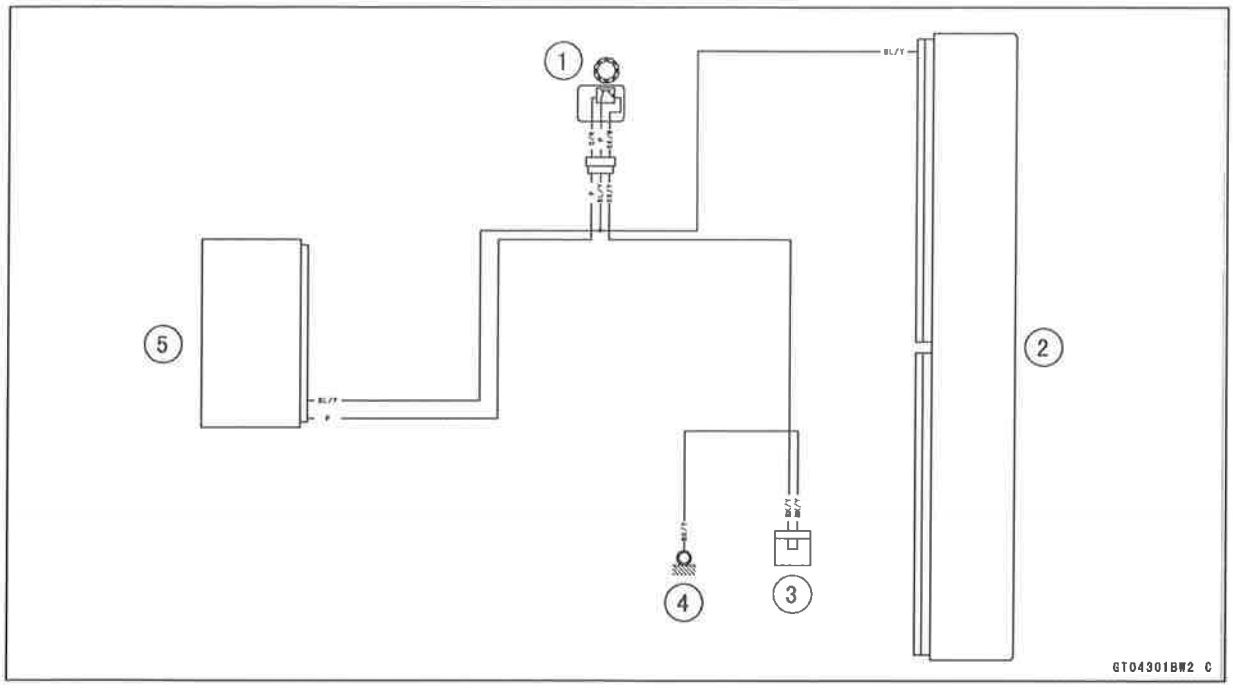
★If the reading is within the standard, check the wiring for continuity (see Speed Sensor Circuit).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Speed Sensor (Service Code 24)

Speed Sensor Circuit



1. Speed Sensor
2. ECU
3. Joint Connector 8
4. Frame Ground
5. Meter Unit

Gear Position Switch (Service Code 25)

Gear Position Switch Removal/Installation

- Refer to the Gear Position Switch Removal/Installation in the Electrical System chapter.

Gear Position Switch Resistance Inspection

- Refer to the Gear Position Switch Inspection in the Electrical System chapter.

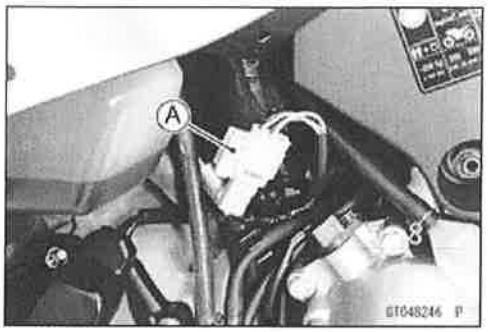
★If the reading is as the specified, check the output voltage (see Gear Position Switch Output Voltage Inspection).

Gear Position Switch Output Voltage Inspection

NOTE

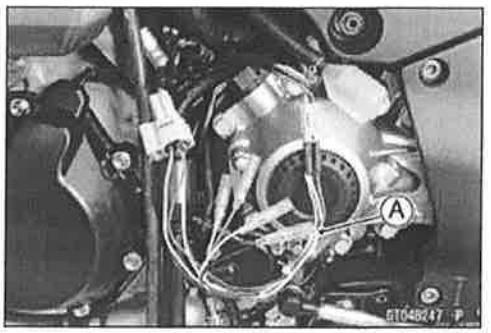
○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the oil pressure switch/gear position switch lead connector [A].



- Connect the measuring adapter [A] between the main harness connector and oil pressure switch/gear position switch lead connector as shown.
  Main Harness [B]
  To Gear Position Switch [C]
  To Oil Pressure Switch [D]

Special Tool - Measuring Adapter: 57001-1700

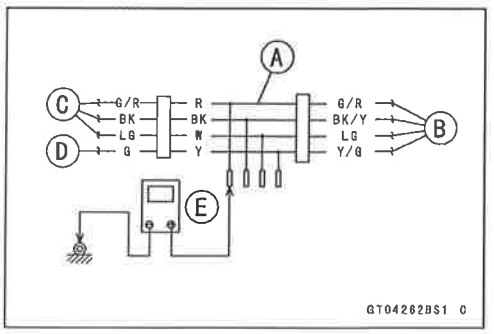


- Connect a digital meter [E] to the measuring adapter lead.

Gear Position Switch Output Voltage
Connections to Adapter:

Digital Meter (+) → R (sensor G/R) lead

Digital Meter (–) → Frame Ground Terminal



- Measure the switch input voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

○When changing the gear position from lower gear to higher gear, raise the rear wheel off the ground with the center stand and rotate the rear wheel by hand.

Output Voltage at 1 ~ 6 Gear Positions
Standard:

1st	**About 3.0 V**
2nd	**About 2.5 V**
3rd	**About 2.0 V**
4th	**About 1.5 V**
5th	**About 1.1 V**
6th	**About 0.7 V**

Gear Position Switch (Service Code 25)

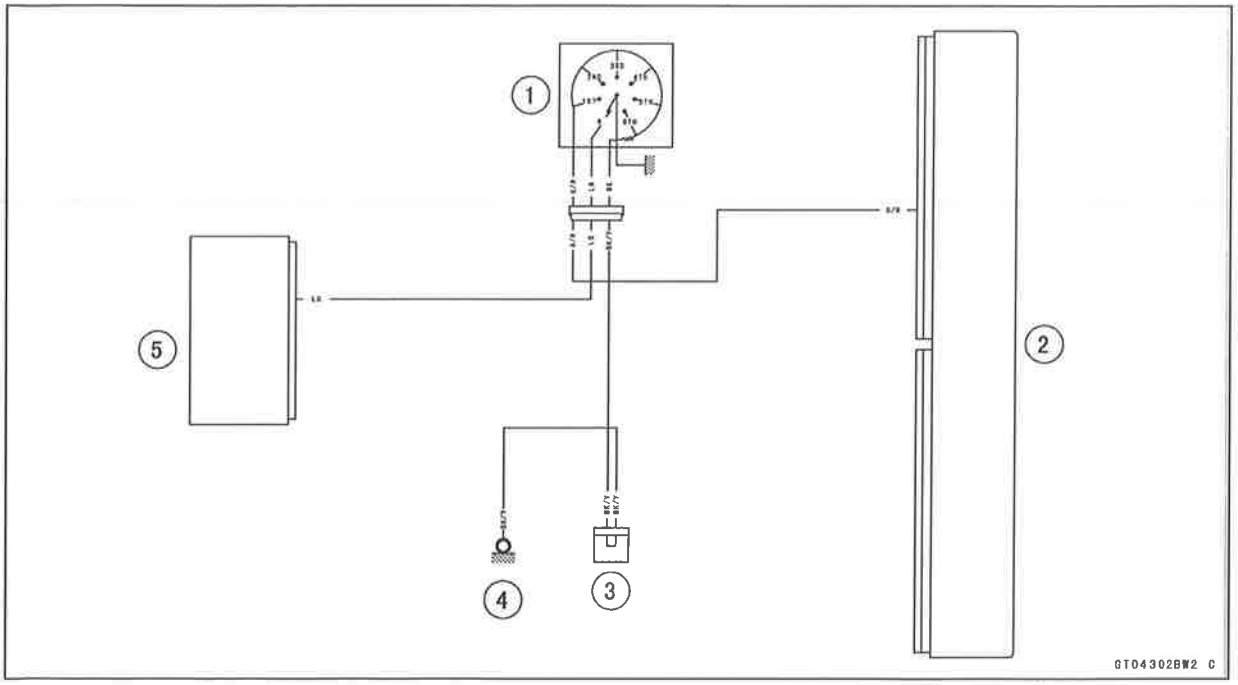
- Turn the key knob to "OFF."

★If the reading is out of the standard, check the wiring for continuity (see Gear Position Switch Circuit).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Gear Position Switch Circuit



1. Gear Position Switch
2. ECU
3. Joint Connector 8
4. Frame Ground
5. Meter Unit

Front and/or Rear Wheel Rotation Sensor Signal (Service Code 27)

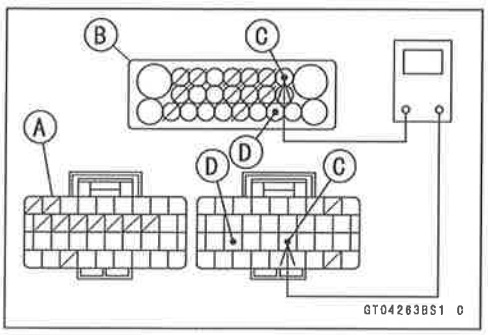
Front and/or Rear Wheel Rotation Sensor Signal Inspection

○The front and rear wheel rotation sensors send the signal to the ECU through the K-ACT ABS hydraulic unit
○The ECU uses the wheel rotation sensor signal for KTRC.
○The service code 27 is detected with the ECU.
• When the service code 27 and following service codes (for K-ACT ABS system) are displayed at the same time, inspect the front and/or rear wheel rotation sensor.
Service Code B 42 (see Front Wheel Rotation Sensor Signal Abnormal)
Service Code B 43 (see Front Wheel Rotation Sensor Wiring Inspection)
Service Code B 44 (see Rear Wheel Rotation Sensor Signal Abnormal)
Service Code B 45 (see Rear Wheel Rotation Sensor Wiring Inspection)

• When only service code 27 is displayed, do the following inspection procedures.
• Disconnect:
ECU Connectors (see ECU Removal in the Fuel System (DFI) chapter)
K-ACT ABS Hydraulic Unit Connector (see K-ACT ABS Hydraulic Unit Removal in the Brakes chapter)

• Check the wiring for continuity between harness connectors.

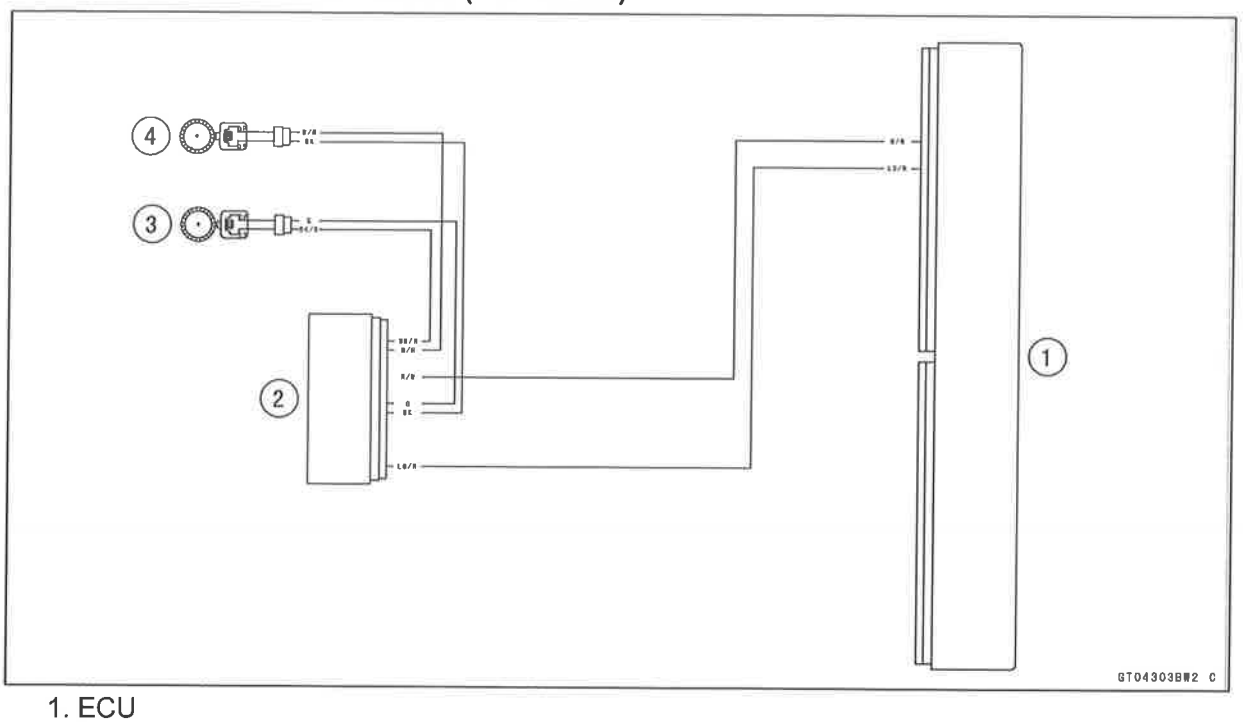
Wiring Continuity Inspection
ECU Connector [A] ← →
K-ACT ABS Hydraulic Unit Connector [B]
LG/R lead (ECU terminal 55, K-ACT ABS Hydraulic Unit terminal 2) [C]
R/W lead (ECU terminal 58, K-ACT ABS Hydraulic Unit terminal 19) [D]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Front and/or Rear Wheel Rotation Sensor Signal (Service Code 27)

Wheel Rotation Sensor Circuit (For KTRC)



1. ECU
2. K-ACT ABS Hydraulic Unit
3. Front Wheel Rotation Sensor
4. Rear Wheel Rotation Sensor

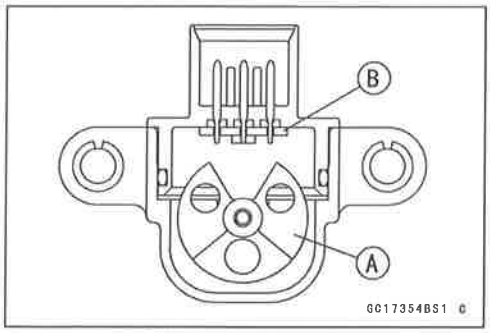
Vehicle-down Sensor (Service Code 31)

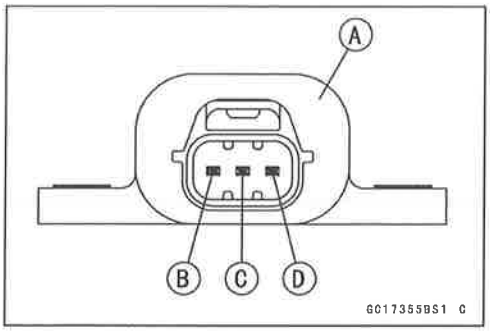
This sensor has a weight [A] with two magnets inside, and sends a signal to the ECU. But when the motorcycle banks 60 ~ 70° or more to either side (in fact falls down), the weight turns and the signal changes. The ECU senses this change, and stops the fuel pump relay, the fuel injectors and the ignition system.

Hall IC [B]

When the motorcycle is down, the key knob is left ON. If the starter button is pushed, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the key knob to "OFF," and then push and turn the key knob to "ON."

Vehicle-down Sensor [A]
Ground Terminal [B]: BR/BK
Output Terminal [C]: Y/G
Power Source Terminal [D]: BL



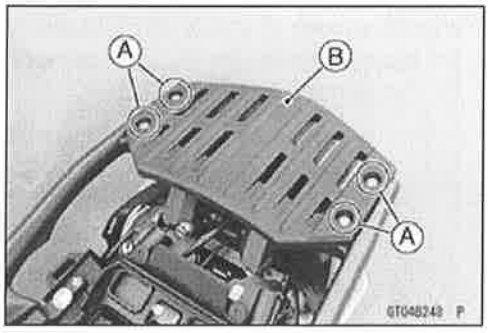


Vehicle-down Sensor Removal

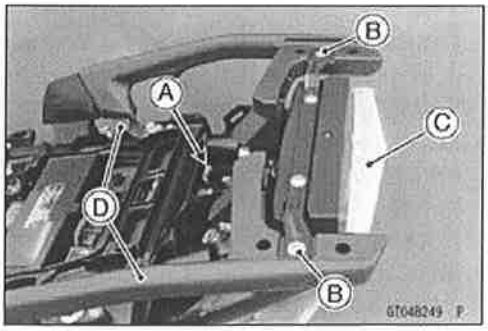
NOTICE

Never drop the vehicle-down sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Remove:
  Left and Right Seat Covers (see Seat Cover Removal in the Frame chapter)
  Carrier Plate Bolts [A]
  Carrier Plate [B]

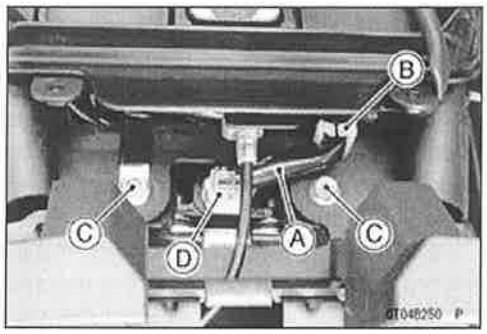


- Free the tail/brake light (LED) lead from the clamp [A].
- Remove the tail/brake light assembly mounting bolts [B] and brackets.
- Take the tail/brake light (LED) [C] off the grab rails [D].
- Remove the tail cover (see Tail Cover Removal in the Frame chapter).

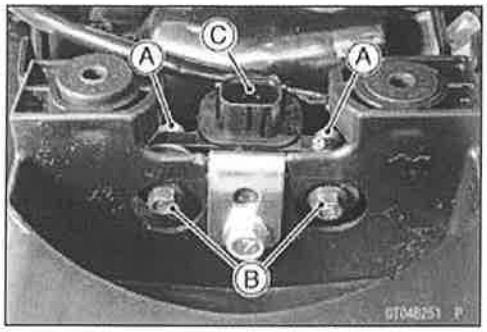


Vehicle-down Sensor (Service Code 31)

- Free the vehicle-down sensor lead [A] from the clamp [B].
- Remove the rear fender mounting bolts [C], and lower the rear fender.
- Disconnect the vehicle-down sensor lead connector [D].

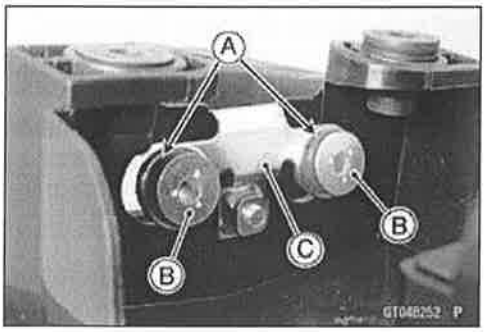


- Remove:
  Vehicle-down Sensor Bolts [A] and Nuts [B]
  Vehicle-down Sensor [C]



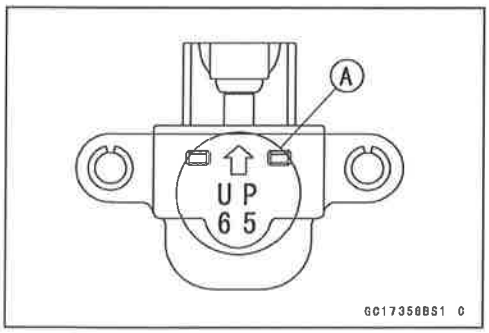
Vehicle-down Sensor Installation

- Be sure to install the rubber dampers [A] and collars [B] on the sensor bracket [C].



- The UP mark [A] of the sensor should face upward.
- Tighten:

Torque - Vehicle-down Sensor Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)



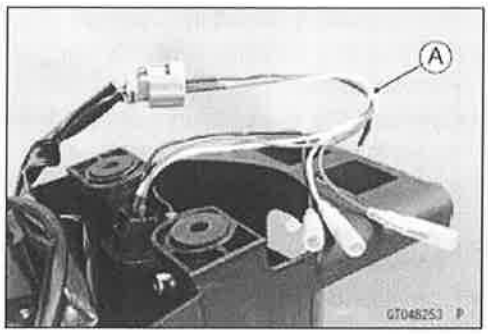
⚠ WARNING

Incorrect installation of the vehicle-down sensor could cause sudden loss of engine power. The rider could lose balance during certain riding situations for an accident resulting in injury or death. Ensure that the vehicle-down sensor is held in place by the sensor bracket.

- Install the removed parts (see appropriate chapters).

Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Input Voltage Inspection



NOTE

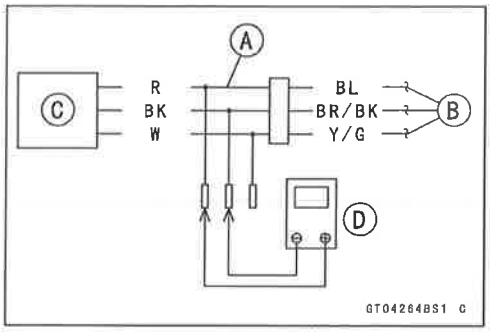
○Be sure the battery is fully charged.

- Turn the key knob to "OFF."
- Disconnect the vehicle-down sensor connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Vehicle-down Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.

Vehicle-down Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL) lead
Digital Meter (–) → BK (sensor BR/BK) lead



- Measure the input voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

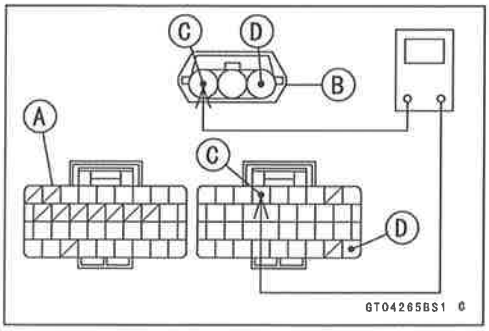
Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the key knob to "OFF."

★If the reading is within the standard, check the output voltage (see Vehicle-down Sensor Output Voltage Inspection).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.



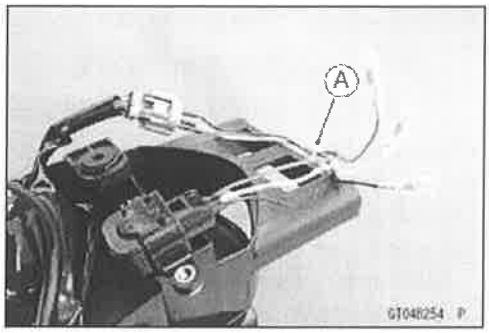
Wiring Continuity Inspection
ECU Connector [A] ←→
Vehicle-down Sensor Connector [B]
BL lead (ECU terminal 40) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Output Voltage Inspection



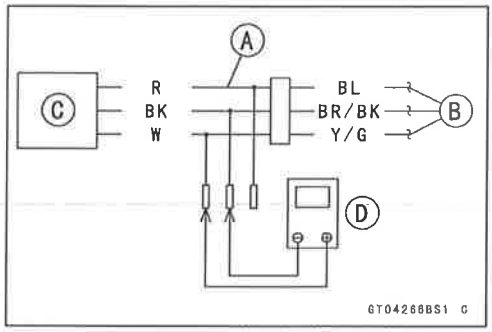
- Remove the vehicle-down sensor (see Vehicle-down sensor Removal).
- Connect the measuring adapter [A] to the vehicle-down sensor connectors as shown.

Special Tool - Measuring Adapter: 57001-1700

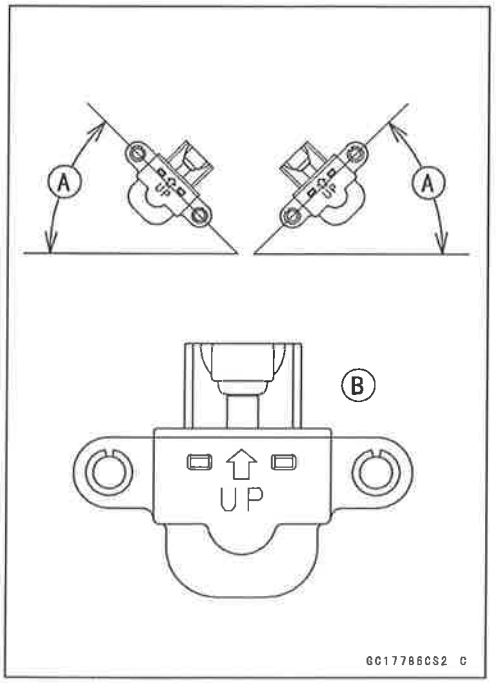
Main Harness [B]
Vehicle-down Sensor [C]

- Connect a digital meter [D] to the measuring adapter leads.

Vehicle-down Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → W (sensor Y/G) lead
Digital Meter (–) → BK (sensor BR/BK) lead



- Hold the sensor vertically.
- Measure the output voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."
- Tilt the sensor 60 ~ 70° or more [A] right or left, then hold the sensor almost vertical with the arrow mark pointed up [B], and measure the output voltage.



Output Voltage
Standard: With sensor tilted 60 ~ 70° or more right or left: DC 0.65 ~ 1.35 V
With sensor arrow mark pointed up: DC 3.55 ~ 4.45 V

- Turn the key knob to "OFF."

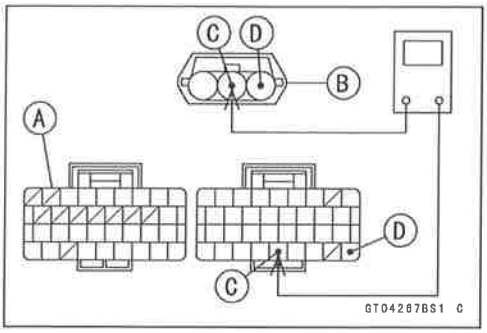
★If the reading is out of the standard, replace the sensor.

Vehicle-down Sensor (Service Code 31)

★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

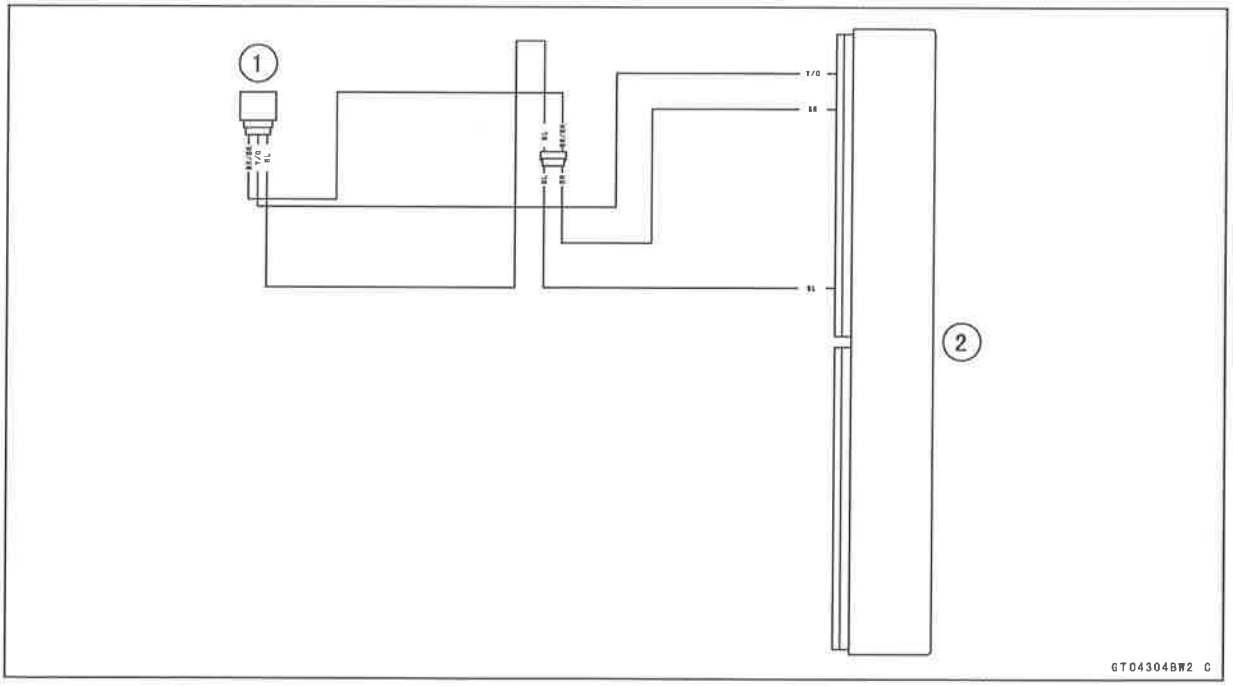
Wiring Continuity Inspection
ECU Connector [A] ←→
Vehicle-down Sensor Connector [B]
Y/G lead (ECU terminal 64) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Vehicle-down Sensor Circuit

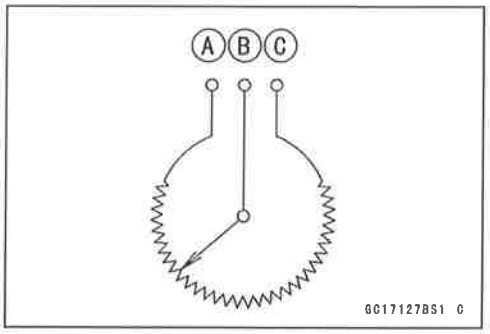


1. Vehicle-down Sensor
2. ECU

Subthrottle Sensor (Service Code 32)

The subthrottle sensor is a rotating variable resistor that change output voltage according to throttle operating. The ECU senses this voltage change and determines fuel injection quantity, and ignition timing according to engine rpm, and throttle opening.

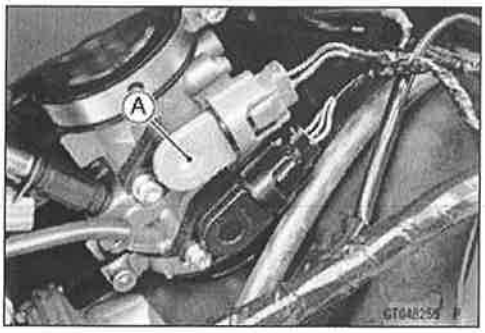
Input Terminal [A]: BL
Output Terminal [B]: BL/W
Ground Terminal [C]: BR/BK



Subthrottle Sensor Removal/Adjustment

NOTICE

Do not remove or adjust the subthrottle sensor [A] since it has been adjusted and set with precision at the factory.
Never drop the throttle body assy especially on a hard surface. Such a shock to the subthrottle sensor can damage it.



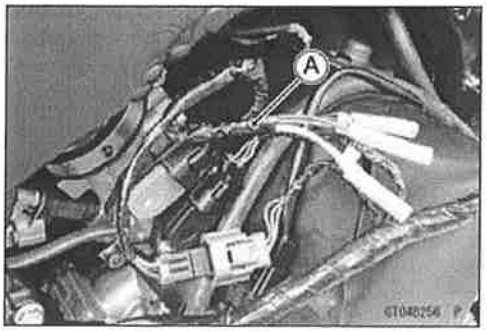
Subthrottle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the right subframe (see Right Subframe Removal in the Frame chapter).
- Disconnect the subthrottle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



- Connect a digital meter to the setting adapter leads.

Subthrottle Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → W (sensor BL) lead
Digital Meter (–) → BK (sensor BR/BK) lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the key knob to "OFF."

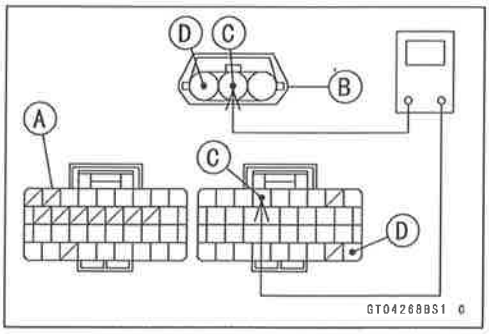
★If the reading is within the standard, check the output voltage (see Subthrottle Sensor Output Voltage Inspection).

Subthrottle Sensor (Service Code 32)

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
BL lead (ECU terminal 40) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

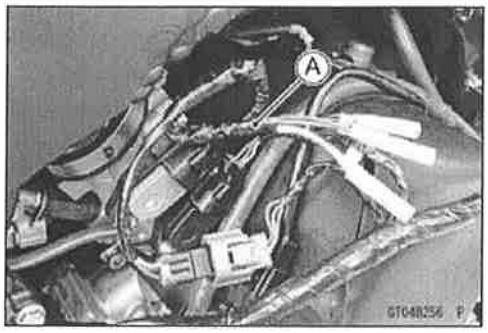
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Subthrottle Sensor Output Voltage Inspection

- Measure the output voltage at the subthrottle sensor in the same way as input voltage inspection, note the following.

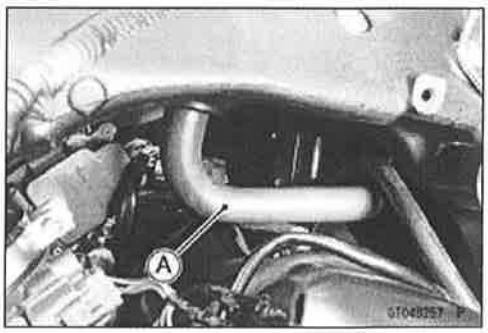
○Disconnect the subthrottle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



Subthrottle Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL/W) lead
Digital Meter (–) → BK (sensor BR/BK) lead

- Disconnect the air switching valve hose [A] from the air cleaner housing.



- Disconnect the subthrottle valve actuator connector [A].
- Remove the air cleaner caps (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).

Subthrottle Sensor (Service Code 32)

- Measure the output voltage with the engine stopped with the connector joined.
- Push and turn the key knob to "ON."
- Measure the output voltage when the subthrottle valves are fully opened by hand.

Output Voltage

Standard: DC 4.05 ~ 4.25 V at subthrottle valve full close position (for reference)

DC 0.61 ~ 0.81 V at subthrottle valve full open position

NOTE

○*Close the subthrottle valves, confirm the output voltage will be raise.*

○*The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.*

○*When the input voltage reading shows other than 5 V, derive a voltage range as follows.*
Example:
In the case of a input voltage of 4.75 V.
0.61 × 4.75 ÷ 5.00 = 0.58 V
0.81 × 4.75 ÷ 5.00 = 0.77 V
Thus, the valid range is 0.58 ~ 0.77 V

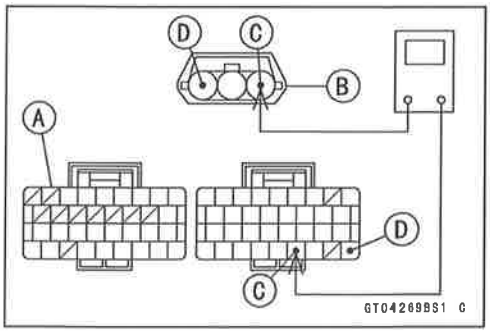
- Turn the key knob to "OFF."

★If the reading is out of the standard, check the subthrottle sensor resistance (see Subthrottle Sensor Resistance Inspection).

★If the reading is within the standard, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
BL/W lead (ECU terminal 63) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]

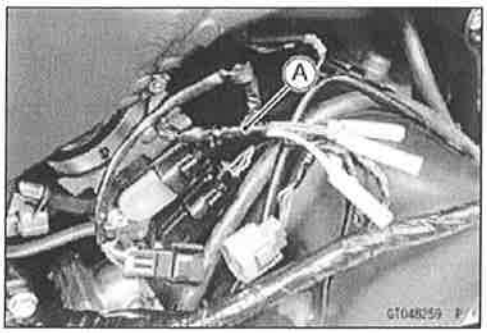


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Subthrottle Sensor (Service Code 32)

Subthrottle Sensor Resistance Inspection



- Turn the key knob to "OFF."
- Disconnect the subthrottle sensor connector.
- Connect the setting adapter [A] to the sensor connector only.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

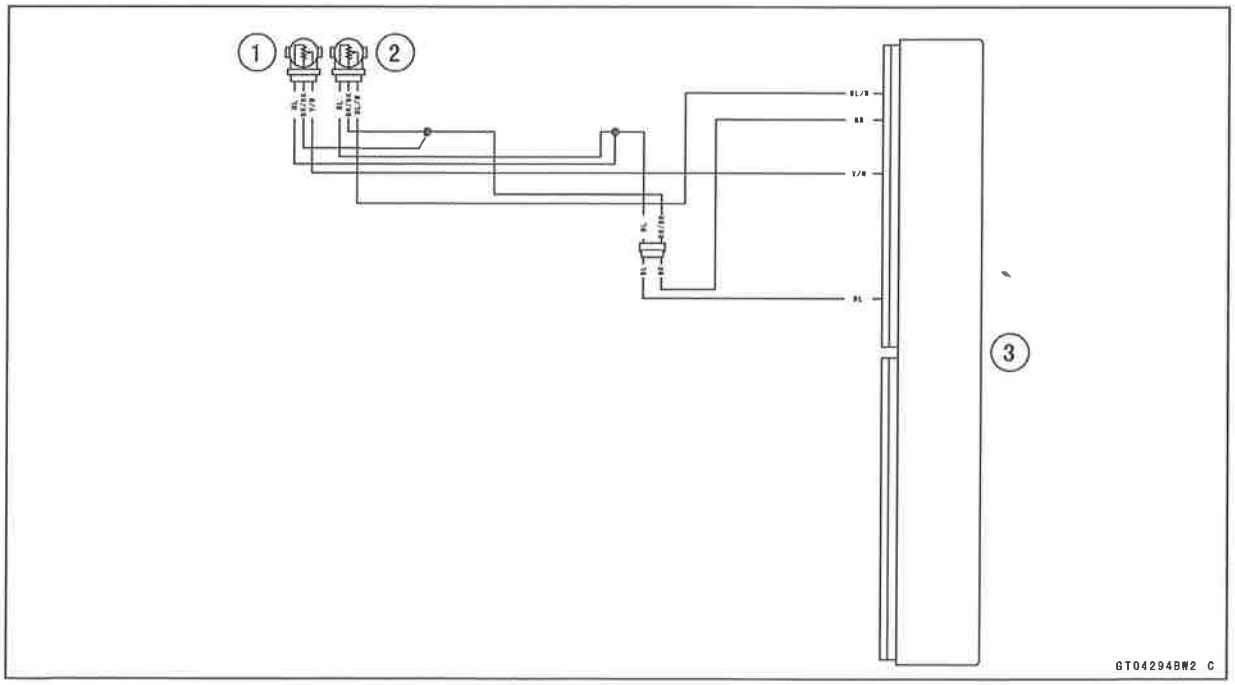
- Measure the subthrottle sensor resistance.

Subthrottle Sensor Resistance
Connections to Adapter:
BK (sensor BL) lead ←→ W (sensor BR/BK) lead
Standard: 4 ~ 6 kΩ

★If the reading is out of the standard, replace the throttle body assy.

★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Subthrottle Sensor Circuit



1. Main Throttle Sensor
2. Subthrottle Sensor
3. ECU

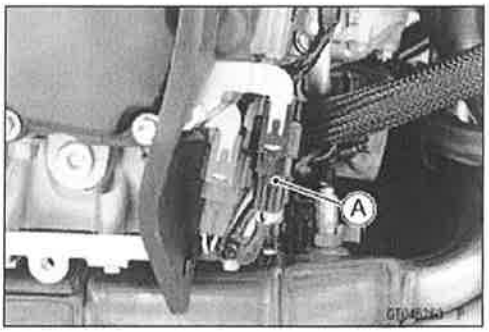
Oxygen Sensor #1 - not activated (Service Code 33)

Oxygen Sensor #1 Removal/Installation

- Refer to the Oxygen Sensor Removal/Installation in the Electrical System chapter.

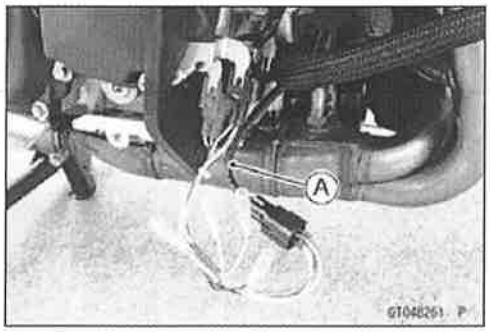
Oxygen Sensor #1 Inspection

- Turn the key knob to "OFF."
- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Right Subframe (see Right Subframe Removal in the Frame chapter)
- Disconnect:
  Oxygen Sensor #1 Lead Connector (Black) [A]



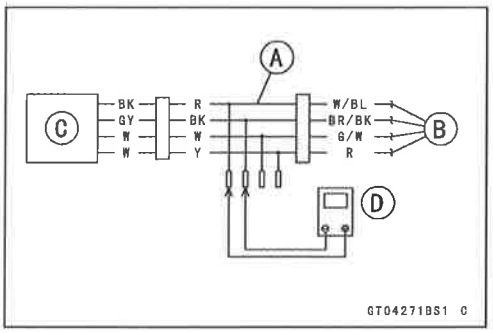
- Connect the measuring adapter [A] between the harness connector and oxygen sensor #1 lead connector as shown.
  Main Harness [B]
  Oxygen Sensor #1 [C]

  Special Tool - Measuring Adapter: 57001-1700



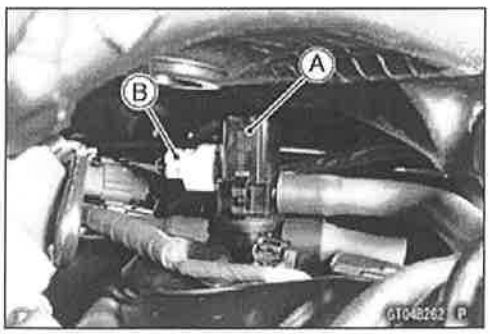
- Connect a digital meter [D] to the measuring adapter leads.

  Oxygen Sensor #1 Output Voltage
  Connections to Adapter:
  Digital Meter (+) → R (sensor BK) lead
  Digital Meter (–) → BK (sensor GY) lead



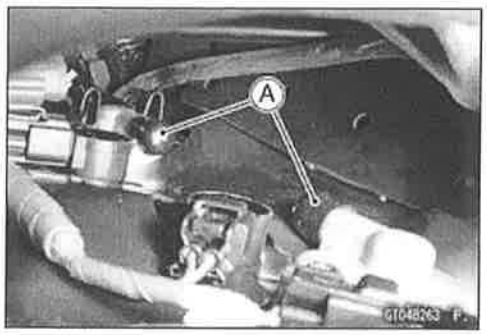
- Remove the air switching valve [A] (see Air Switching Valve Removal in the Engine Top End chapter).

○Do not disconnect the air switching valve connector [B].



Oxygen Sensor #1 - not activated (Service Code 33)

- Install the suitable plugs [A] on the fitting of the air suction valve covers, and shut off the secondary air.



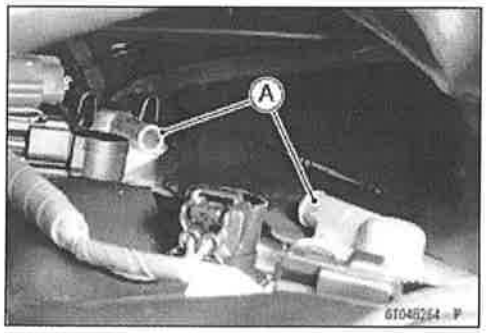
- Warm up the engine thoroughly until the radiator fan starts.
- Measure the output voltage with the connector joined.

Output Voltage (with Plugs)
Standard: DC 0.8 V or more

- Next, remove the plugs from the fittings [A] with idling.

⚠ WARNING

The engine gets extremely hot during normal operation and can cause serious burns. Never touch a hot engine.



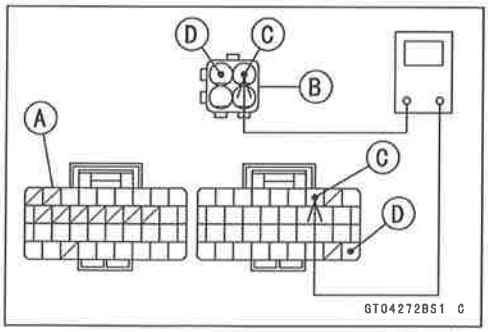
- Measure the output voltage with the connector joined.

Output Voltage (without Plugs)
Standard: DC 0.24 V or less

- Turn the key knob to "OFF."

★If the reading is out of the standard (with plugs: DC 0.8 V or more, without plugs: DC 0.24 V or less), remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.



Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor #1 Connector [B]
W/BL lead (ECU terminal 37) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]

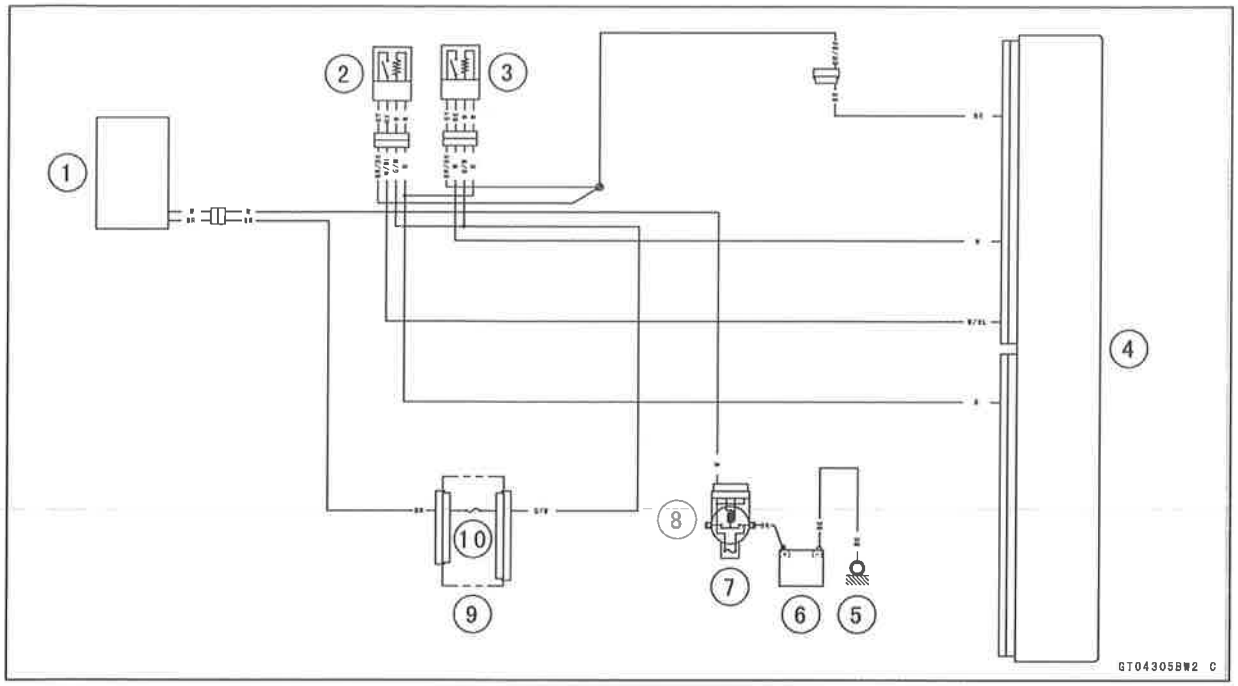
★If the wiring is good, replace the sensor.

★If the reading is within the standard (with plugs: DC 0.8 V or more, without plugs: DC 0.24 V or less), check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Oxygen Sensor #1 - not activated (Service Code 33)

Oxygen Sensor Circuit



1. Steering Lock Unit
2. Oxygen Sensor #1
3. Oxygen Sensor #2
4. ECU
5. Frame Ground
6. Battery 12 V 14 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 3
10. Oil Control Solenoid Valve Fuse 15 A

Steering Lock Unit and ECU Communication Error (Service Code 37, 38)

Steering Lock Unit and ECU Communication Line Inspection

○When the data is not sent from the steering lock unit to the KIPASS ECU, the service code 37 is displayed.
○When the data is not sent from the ECU to the KIPASS ECU, the service code 38 is displayed.
○The data is sent through the CAN communication line.
○The service code 37, 38 are detected with the KIPASS ECU.

Service Code 37

- Inspect the CAN communication line (see CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter).

★If the CAN communication line is normal, check the steering lock unit (see Steering Lock Unit Inspection).
★If the steering lock unit is normal, check the KIPASS ECU for its ground and power supply (see KIPASS ECU Power Supply Inspection in the Electrical System chapter).
★If the ground and power supply are good, replace the KIPASS ECU (see KIPASS ECU Replacement in the Electrical System chapter).

Service Code 38

- Inspect the CAN communication line (see CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter).

★If the CAN communication line is normal, check the ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ECU is normal, check the KIPASS ECU for its ground and power supply (see KIPASS ECU Power Supply Inspection in the Electrical System chapter).
★If the ground and power supply are good, replace the KIPASS ECU (see KIPASS ECU Replacement in the Electrical System chapter).

KIPASS ECU Communication Error (Service Code 39)

KIPASS ECU Communication Line Inspection

○When the data is not sent from the KIPASS ECU to the meter unit, the service code 39 is displayed.
○The data is sent through the CAN communication line.
○The service code 39 is detected with the meter unit.
● Inspect the CAN communication line (see CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter).
★If the CAN communication line is normal, check the KIPASS ECU (see KIPASS ECU Power Supply Inspection in the Electrical System chapter).
★If the KIPASS ECU is normal, check the meter unit (see Meter Unit Inspection in the Electrical System chapter).
★If the meter unit is normal, but the problem still exists, replace the meter unit (see Meter Unit Removal/Installation in the Electrical System chapter).

Fuel Pump Relay (Service Code 46)

Fuel Pump Relay Removal/Installation

○The fuel pump relay is built in the relay box [A].

- Refer to the Relay Box Removal in the Electrical System chapter.

Fuel Pump Relay Inspection

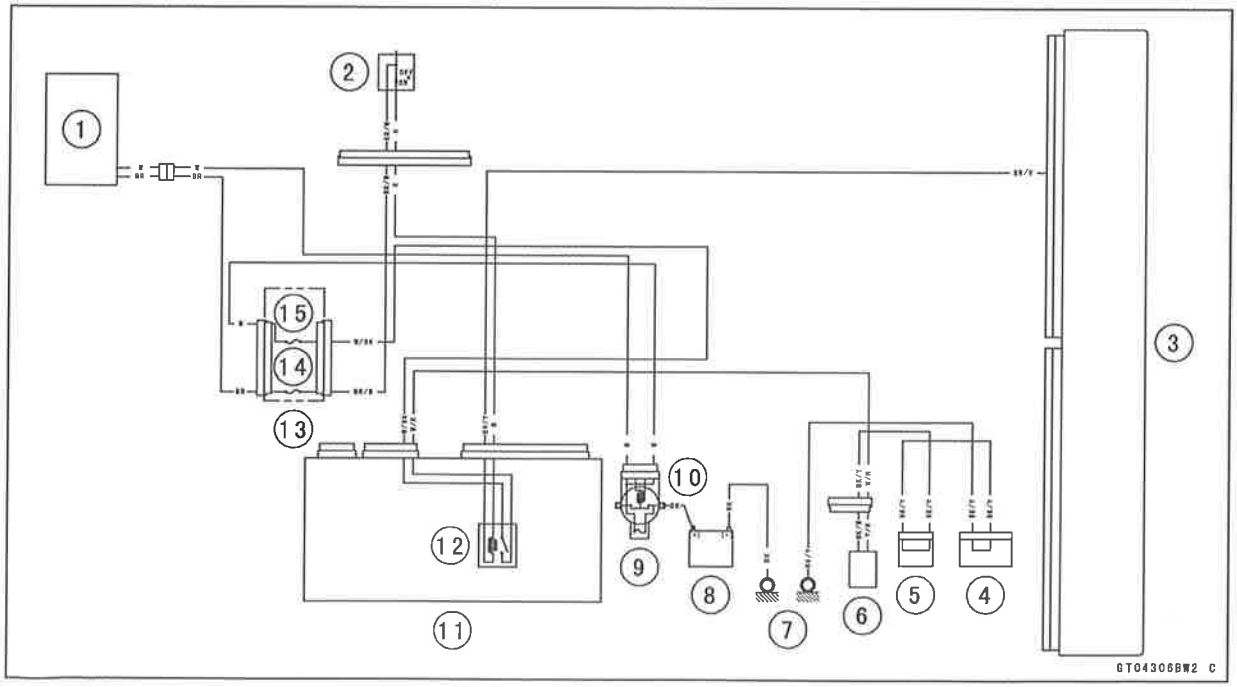
- Refer to the Relay Circuit Inspection in the Electrical System chapter.

★If the fuel pump relay is normal, check the wiring for continuity (see Fuel Pump Relay Circuit).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Fuel Pump Relay Circuit



1. Steering Lock Unit
2. Engine Stop Switch
3. ECU
4. Joint Connector 1
5. Joint Connector 2
6. Fuel Pump
7. Frame Ground
8. Battery 12 V 14 Ah
9. Main Fuse 30 A
10. Starter Relay
11. Relay Box
12. Fuel Pump Relay
13. Fuse Box 2
14. Ignition Fuse 15 A
15. ECU Fuse 15 A

Stick Coils #1, #2, #3, #4: (Service Code 51, 52, 53, 54)

Stick Coil #1: Service Code 51
Stick Coil #2: Service Code 52
Stick Coil #3: Service Code 53
Stick Coil #4: Service Code 54

Stick Coil Removal/Installation

- Refer to the Stick Coil Removal/Installation in the Electrical System chapter.

Stick Coil Primary Winding Resistance Inspection

- Refer to the Stick Coil Inspection in the Electrical System chapter.

★If the reading is within the standard, check the input voltage (see Stick Coil Input Voltage Inspection).

Stick Coil Input Voltage Inspection

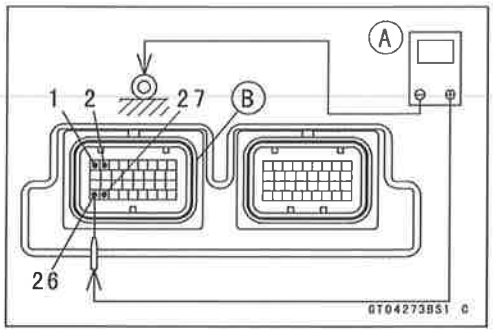
NOTE

○Be sure the battery is fully charged.

- Turn the key knob to "OFF."
- Remove the ECU (see ECU Removal in the Fuel System (DFI) chapter).

○Do not disconnect the ECU connectors.

- Connect a digital meter [A] to the connector [B] with the needle adapter set.



Special Tool - Needle Adapter Set: 57001-1457

Stick Coil Input Voltage
Connections to ECU Connector:
For Stick Coil #1
Digital Meter (+) → W/R lead (terminal 26)
Digital Meter (–) → Frame Ground Terminal
For Stick Coil #2
Digital Meter (+) → W/BL lead (terminal 27)
Digital Meter (–) → Frame Ground Terminal
For Stick Coil #3
Digital Meter (+) → W/G lead (terminal 1)
Digital Meter (–) → Frame Ground Terminal
For Stick Coil #4
Digital Meter (+) → W/Y lead (terminal 2)
Digital Meter (–) → Frame Ground Terminal

- Measure the input voltage to each primary winding of the stick coils with the engine stopped and with the connectors joined.
- Turn the engine stop switch to run position.
- Push and turn the key knob to "ON."

Input Voltage
Standard: Battery Voltage

Stick Coils #1, #2, #3, #4: (Service Code 51, 52, 53, 54)

- Turn the key knob to "OFF."

★If the input voltage is out of the standard, check the wiring for continuity (see Stick Coil Circuit).

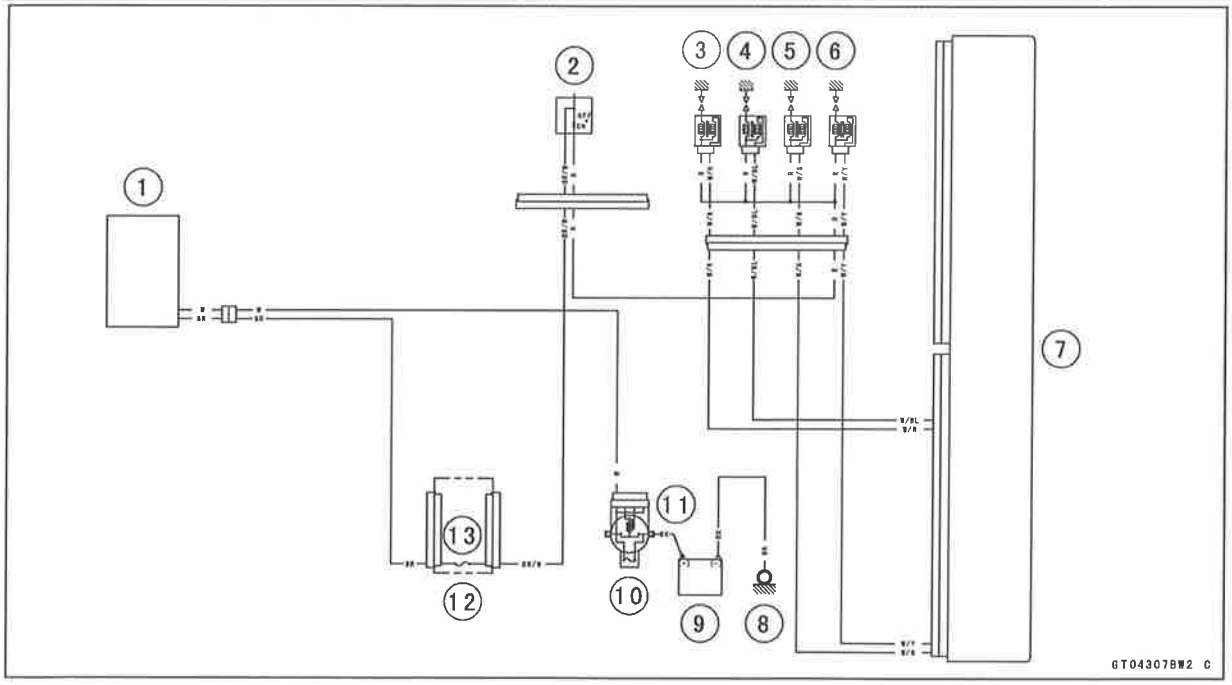
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

★If the input voltage is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Stick Coil Circuit



1. Steering Lock Unit
2. Engine Stop Switch
3. Stick Coil #1
4. Stick Coil #2
5. Stick Coil #3
6. Stick Coil #4
7. ECU
8. Frame Ground
9. Battery 12 V 14 Ah
10. Main Fuse 30 A
11. Starter Relay
12. Fuse Box 2
13. Ignition Fuse 15 A

Radiator Fan Relay (Service Code 56)

Radiator Fan Relay Removal/Installation

○The radiator fan relay is built in the relay box [A].

- Refer to the Relay Box Removal in the Electrical System chapter.

Radiator Fan Relay Inspection

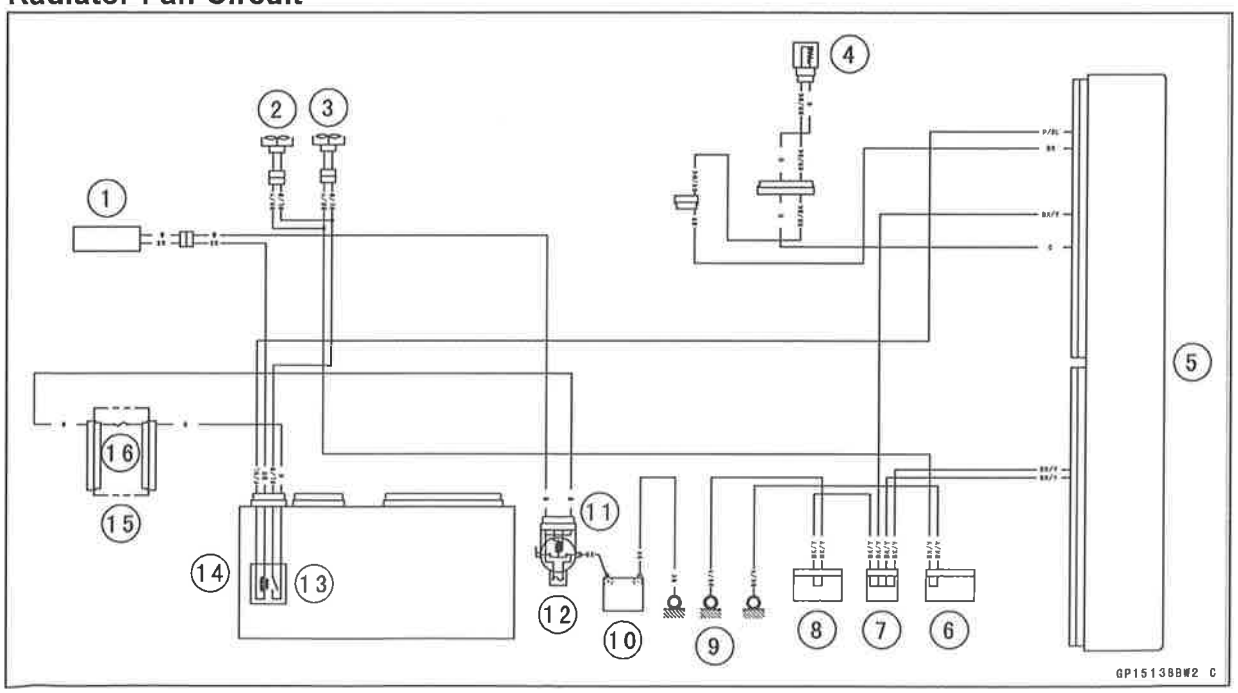
- Refer to the Relay Circuit Inspection in the Electrical System chapter.

★If the radiator fan relay is normal, check the wiring for continuity (see Radiator Fan Circuit).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Radiator Fan Circuit



1. Steering Lock Unit
2. Fan Motor
3. Fan Motor
4. Water Temperature Sensor
5. ECU
6. Joint Connector 1
7. Joint Connector 3
8. Joint Connector 9
9. Frame Ground
10. Battery 12 V 14 Ah
11. Starter Relay
12. Main Fuse 30 A
13. Fan Relay
14. Relay Box
15. Fuse Box 2
16. Fan Fuse 15 A

Variable Valve Timing and Oil Control Solenoid Valve (Service Code 59, 65)

Oil Control Solenoid Valve Removal/Installation

NOTICE
Never drop the oil control solenoid valve especially on a hard surface. Such a shock to the oil control solenoid valve can damage it.

- Refer to the Oil Control Solenoid Valve Removal/Installation in the Lubrication System chapter.

Oil Control Solenoid Valve Inspection

NOTE

○*Normally, when the service code 59 is displayed, service code 65 is generally displayed, too.*

○*When only service code 59 is displayed, use Kawasaki Diagnostic System (KDS Ver.3) to confirm actuator function/failure.*

- Inspect the oil control solenoid valve resistance (see Oil Control Solenoid Valve Inspection in the Electrical System chapter).

★If the reading is standard, check the function of the oil control solenoid valve, Using the Kawasaki Diagnostic System (KDS Ver.3) .

NOTE

○*Read the OCV Solenoid Test in the Kawasaki Diagnostic System (KDS Ver.3) Instruction Manual.*

★If the oil control solenoid valve does not function, check it for any tips interlocked or seizure.

★If the oil control solenoid valve functions, check or replace the variable valve timing actuator when the service code 59 is indicated.

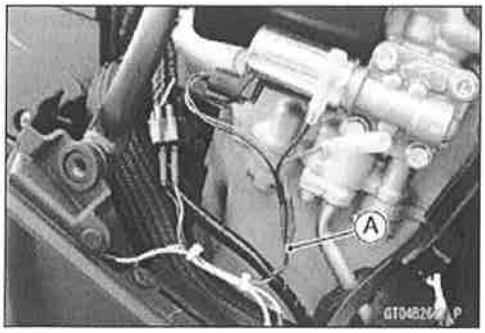
Variable Valve Timing and Oil Control Solenoid Valve (Service Code 59, 65)

★If the OCV Solenoid Test is normal, check the power source voltage.

NOTE

○*Be sure the battery is fully charged.*

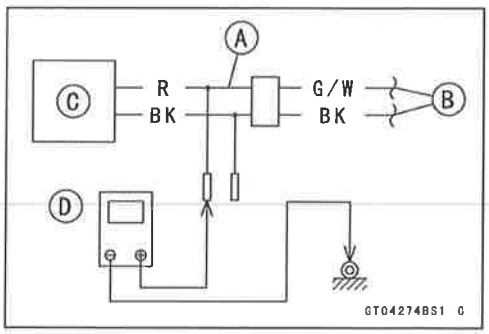
- Turn the key knob to "OFF."
- Disconnect the oil control solenoid valve connector and connect the measuring adapter [A] between these connectors as shown.
  Harness [B]
  Oil Control Solenoid Valve [C]



Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter lead.

Oil Control Solenoid Valve Power Source Voltage
Connections to Adapter:
Digital Meter (+) → R (valve G/W) lead
Digital Meter (–) → Frame Ground Terminal



- Measure the power source voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Power Source Voltage
Standard: Battery Voltage

- Turn the key knob to "OFF."

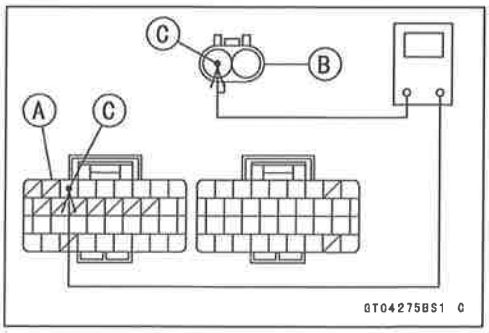
★If the reading is standard, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

★If the reading is out of the standard, check the following.
Oil Control Solenoid Valve Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
Power Source Wiring (see Variable Valve Timing System Circuit)

★If the fuse and wiring are good, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and valve connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Oil Control Solenoid Valve Connector [B]
BK lead (ECU terminal 7) [C]

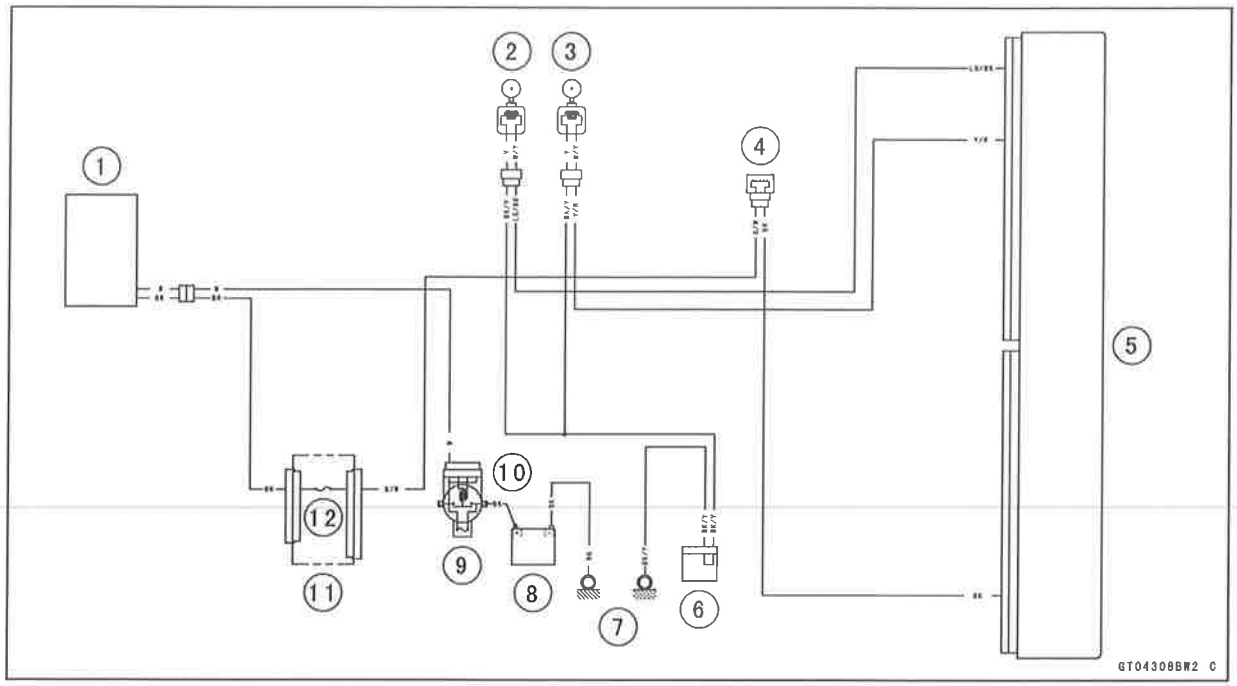


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Variable Valve Timing and Oil Control Solenoid Valve (Service Code 59, 65)

Variable Valve Timing System Circuit



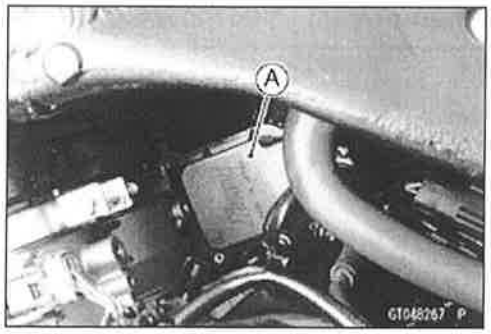
1. Steering Lock Unit
2. Exhaust Camshaft Position Sensor
3. Intake Camshaft Position Sensor
4. Oil Control Solenoid Valve
5. ECU
6. Joint Connector 8
7. Frame Ground
8. Battery 12 V 14 Ah
9. Main Fuse 30 A
10. Starter Relay
11. Fuse Box 3
12. Oil Control Solenoid Valve Fuse 15 A

Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Removal

NOTICE

Do not remove the subthrottle valve actuator [A] since it has been adjusted and set with precision at the factory.
Never drop the throttle body assy especially on a hard surface. Such a shock to the subthrottle valve actuator can damage it.



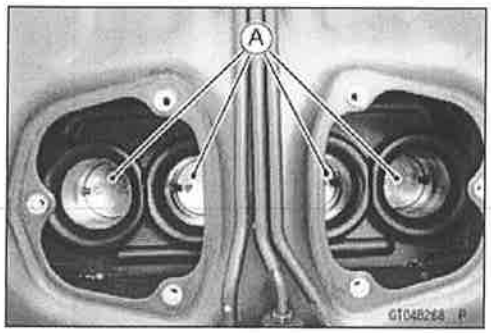
Subthrottle Valve Actuator Inspection

NOTE

○*Be sure the battery is fully charged.*

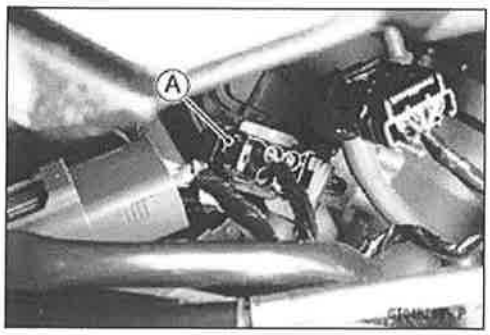
- Remove the air cleaner caps (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).
- Push and turn the key knob to "ON."
- Check to see that all the subthrottle valves [A] open and close smoothly.
- Turn the key knob to "OFF."

★If the subthrottle valves do not operate, check the subthrottle valve actuator resistance (see Subthrottle Valve Actuator Resistance Inspection).



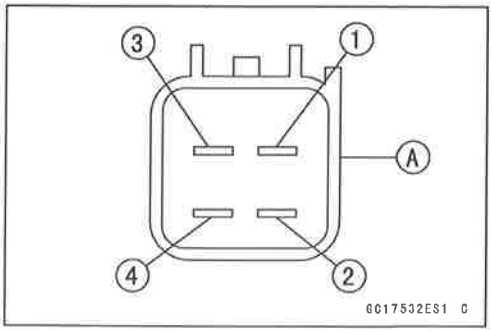
Subthrottle Valve Actuator Resistance Inspection

- Turn the key knob to "OFF."
- Remove the left subframe (see Left Subframe Removal in the Frame chapter).
- Disconnect the subthrottle valve actuator connector [A].



- Connect a digital meter to the subthrottle valve actuator connector [A].
- Measure the subthrottle valve actuator resistance.

Subthrottle Valve Actuator Resistance
Connections: **Y lead [1] ←→ P lead [2]**
BK lead [3] ←→ G lead [4]
Standard: **About 5 ~ 7 Ω**

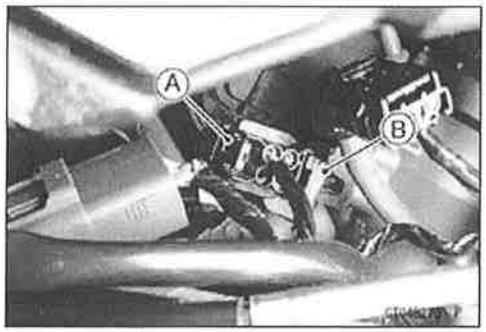


★If the reading is out of the standard, replace the throttle body assy.

★If the reading is within the standard, check the input voltage (see Subthrottle Valve Actuator Input Voltage Inspection).

Subthrottle Valve Actuator (Service Code 62)

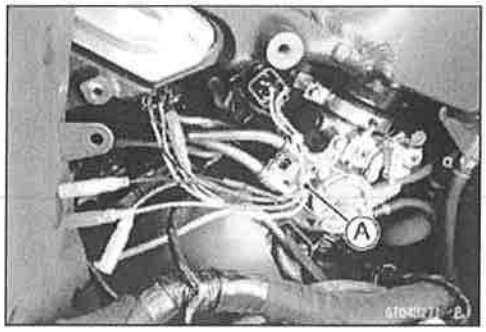
Subthrottle Valve Actuator Input Voltage Inspection



NOTE

○*Be sure the battery is fully charged*

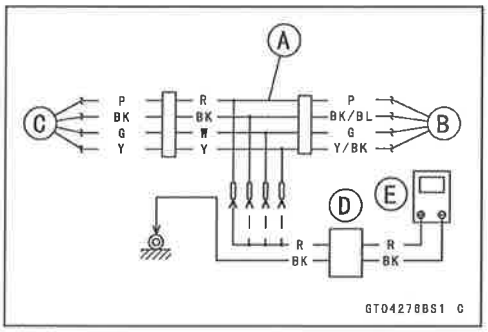
- Turn the key knob to "OFF."
- Remove the left subframe (see Left Subframe Removal in the Frame chapter).
- Disconnect the subthrottle valve actuator connector [A].
- Remove the harness connector from the bracket [B].



- Connect the measuring adapter [A] between the harness connector and subthrottle valve actuator.
  Throttle Body Subharness [B]
  To Subthrottle Valve Actuator [C]

  Special Tool - Measuring Adapter: 57001-1700
- Connect the peak voltage adapter [D] and a digital meter [E] to the measuring adapter leads.

  Special Tool - Peak Voltage Adapter: 57001-1415
  Type: KEK-54-9-B



Subthrottle Valve Actuator Input Voltage
Connections to Adapter:

(I) Digital Meter (+) → R (actuator P) lead
Digital Meter (–) → Frame Ground Terminal

(II) Digital Meter (+) → BK (actuator BK) lead
Digital Meter (–) → Frame Ground Terminal

(III) Digital Meter (+) → W (actuator G) lead
Digital Meter (–) → Frame Ground Terminal

(IV) Digital Meter (+) → Y (actuator Y) lead
Digital Meter (–) → Frame Ground Terminal

- Measure the actuator input voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Input Voltage

Standard: About DC 8.5 ~ 10.5 V, and then 0 V or About DC 8.5 ~ 10.5 V

- Turn the key knob to "OFF."

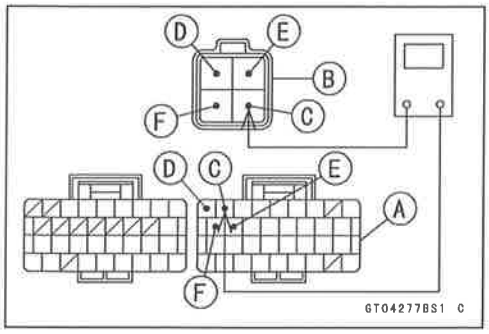
★If the reading is in specification, but the actuator does not operate, replace the throttle body assy.

Subthrottle Valve Actuator (Service Code 62)

★If the reading is out of the specification, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and actuator connectors.

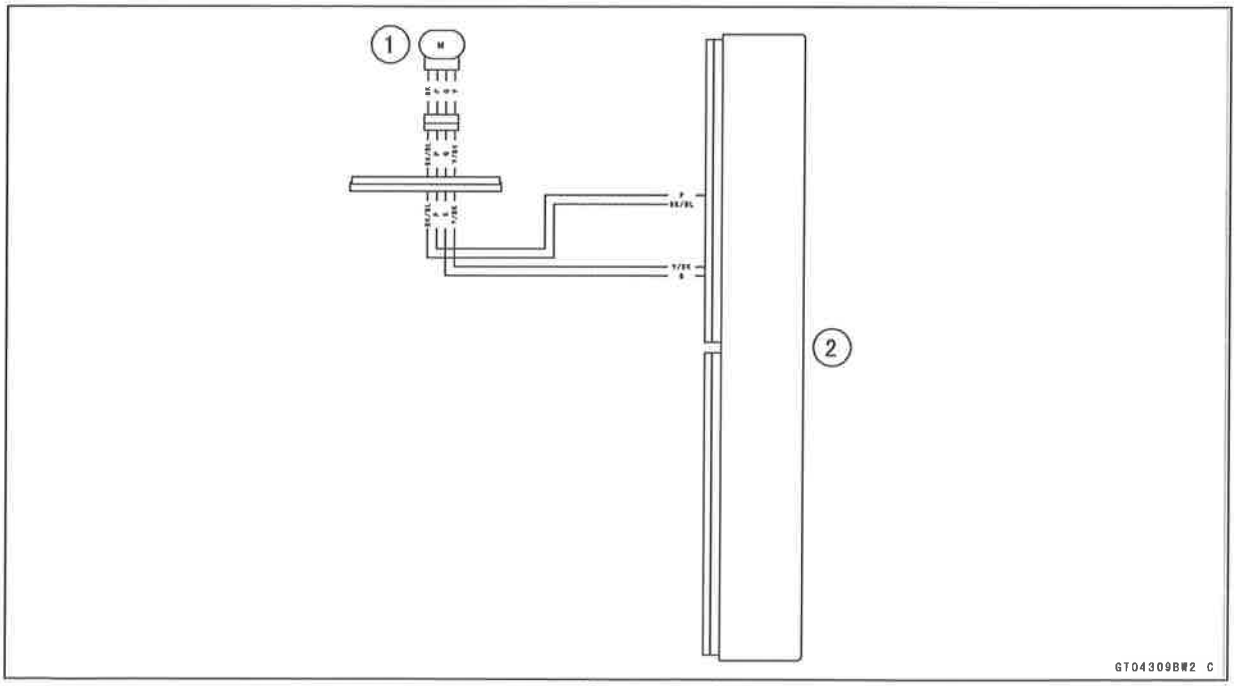
Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Valve Actuator Connector [B]
G lead (ECU terminal 42) [C]
Y/BK lead (ECU terminal 43) [D]
BK/BL lead (ECU terminal 50) [E]
P lead (ECU terminal 51) [F]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Subthrottle Valve Actuator Circuit



1. Subthrottle Valve Actuator
2. ECU

Air Switching Valve (Service Code 64)

Air Switching Valve Removal/Installation

- Refer to the Air Switching Valve Removal/Installation in the Engine Top End chapter.

Air Switching Valve Inspection

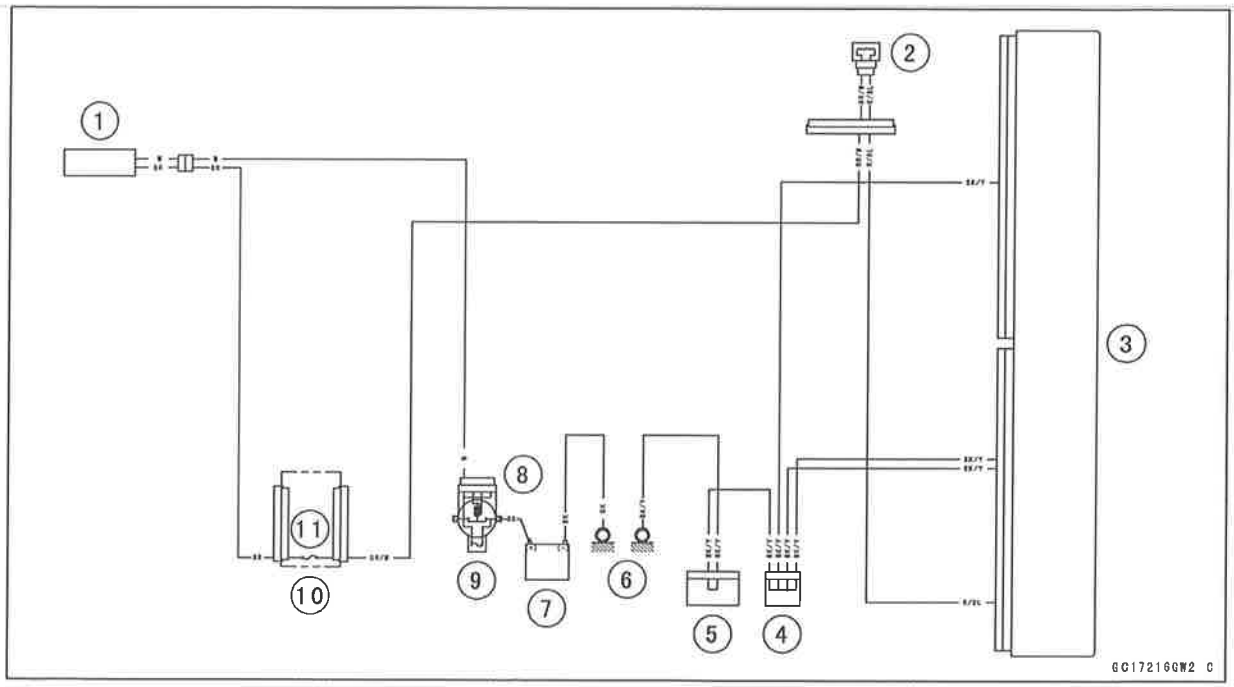
- Refer to the Air Switching Valve Unit Test in the Electrical System chapter.

★If the air switching valve is normal, check the wiring for continuity (see Air Switching Valve Circuit).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Air Switching Valve Circuit



1. Steering Lock Unit
2. Air Switching Valve
3. ECU
4. Joint Connector 3
5. Joint Connector 9
6. Frame Ground
7. Battery 12 V 14 Ah
8. Starter Relay
9. Main Fuse 30 A
10. Fuse Box 2
11. Ignition Fuse 15 A

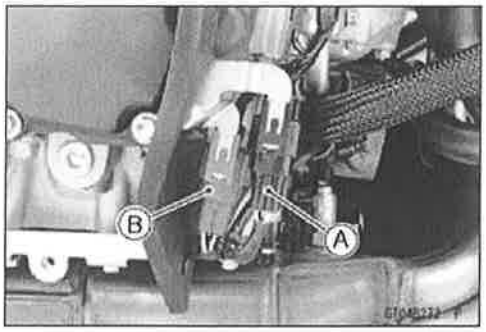
Oxygen Sensor Heater #1 and/or #2 (Service Code 67)

Oxygen Sensor Heater Removal/Installation

The oxygen sensor heater is built in the oxygen sensor. So, the heater itself can not be removed. Remove the oxygen sensor (see Oxygen Sensor Removal in the Electrical System chapter).

Oxygen Sensor Heater Resistance Inspection

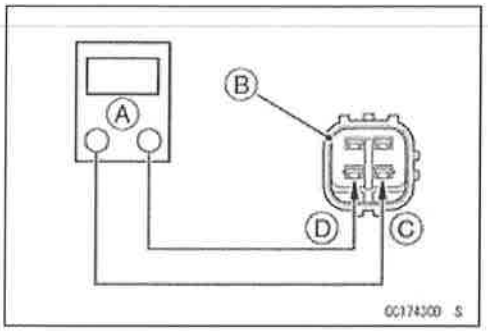
- Turn the key knob to "OFF."
- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect:
  Oxygen Sensor #1 Lead Connector (Black) [A]
  Oxygen Sensor #2 Lead Connector (Gray) [B]



- Connect a digital meter [A] to the terminals in each oxygen sensor lead connector [B].
- Measure the oxygen sensor heater resistance.

Oxygen Sensor Heater #1 and #2 Resistance
Connections: W lead [C] ←→ W lead [D]
Standard: 6.7 ~ 10.5 Ω @20° (68°F)

★If the reading is out of the standard, replace the sensor.
★If the reading is within the standard, check the power source voltage (see Oxygen Sensor Heater Power Source Voltage Inspection).



Oxygen Sensor Heater #1 and/or #2 (Service Code 67)

Oxygen Sensor Heater Power Source Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the oxygen sensor #1 and #2 lead connectors and connect the measuring adapter [A] between these connectors as shown.

Main Harness [B]
Oxygen Sensor #1 [C]
Oxygen Sensor #2 [D]

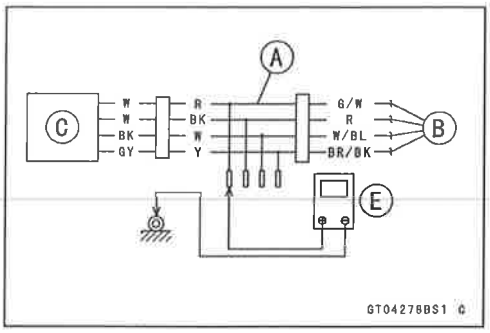
Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [E] to the measuring adapter lead.

Oxygen Sensor Heater #1 and #2 Power Source Voltage
Connections to Adapter:

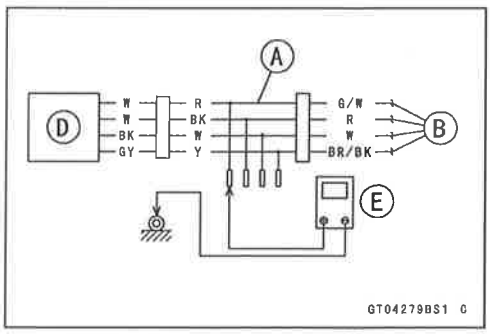
Digital Meter (+) → R (main harness G/W) lead

Digital Meter (–) → Frame Ground Terminal



- Measure the power source voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Power Source Voltage
Standard: Battery Voltage



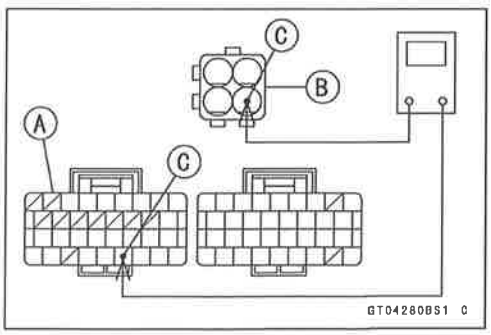
- Turn the key knob to "OFF."

★If the reading is in specification, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

★If the reading is out of the standard, check the following.
Oil Control Solenoid Valve Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
Power Source Wiring (see Oxygen Sensor Circuit)

★If the fuse and wiring are good, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.



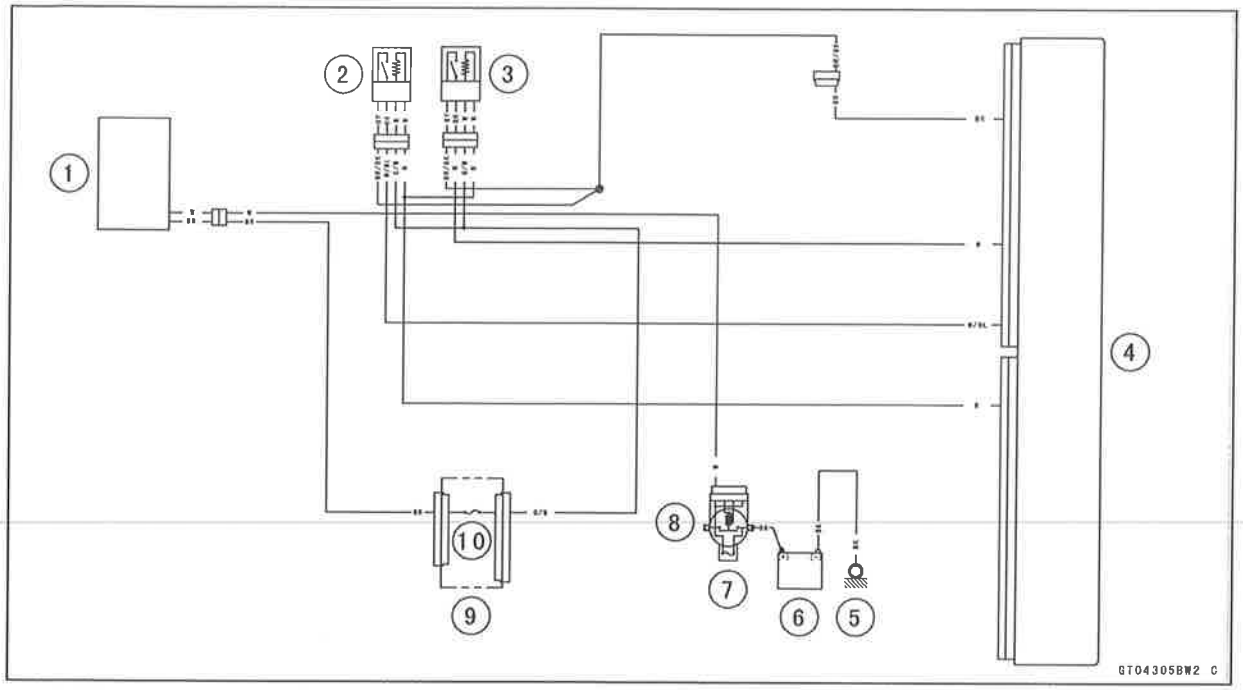
Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor #1 and #2 Connectors [B]
R lead (ECU terminal 29) [C]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Oxygen Sensor Heater #1 and/or #2 (Service Code 67)

Oxygen Sensor Circuit



1. Steering Lock Unit
2. Oxygen Sensor #1
3. Oxygen Sensor #2
4. ECU
5. Frame Ground
6. Battery 12 V 14 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 3
10. Oil Control Solenoid Valve Fuse 15 A

Steering Lock Unit (Service Code 68)

Steering Lock Unit Removal/Installation

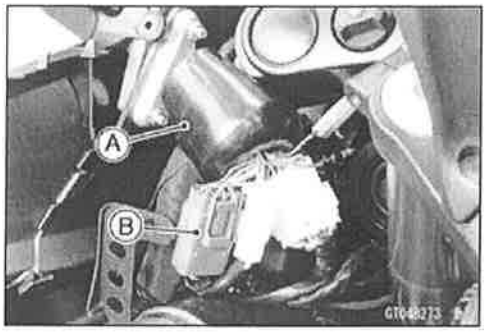
- Refer to the Steering Lock Unit Replacement in the Electrical System chapter.

Steering Lock Unit Inspection

NOTE

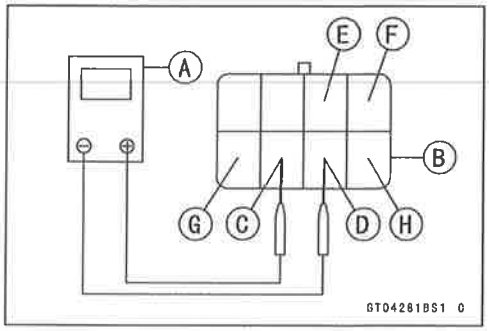
○*Be sure the battery is fully charged.*

- Turn the key knob to "OFF."
- Remove the left inner cover (see Inner Cover Removal in the Frame chapter).
- Slide the dust cover [A] and free the steering lock unit lead connector [B].



- Connect a digital meter [A] to the steering lock unit lead connector [B] with the needle adapter set.

Special Tool - Needle Adapter Set : 57001-1457



Steering Lock Unit Inspection
Connections to Main Harness Side Connector:

(I) Digital Meter (+) → W lead [C]
Digital Meter (–) → BK/Y lead [D]
(II) Digital Meter (+) → BR/W lead [E]
Digital Meter (–) → BK/Y lead [D]
(III) Digital Meter (+) → R/W lead [F]
Digital Meter (–) → BK/Y lead [D]
(IV) Digital Meter (+) → LG/BK lead [G]
Digital Meter (–) → BK/Y lead [D]
(V) Digital Meter (+) → BR/Y lead [H]
Digital Meter (–) → BK/Y lead [D]

- Measure the steering lock unit voltage with the engine stopped and with the connector joined.
- Push and turn the key knob to "ON."

Steering Lock Unit Voltage (Key Knob ON)
(I), (II), (III): Battery Voltage
(IV): DC 4.75 ~ 5.15 V
(V): 0 V

- Turn the key knob to "OFF."

Steering Lock Unit Voltage (Key Knob OFF)
(I): Battery Voltage
(II): 0 V
(III): Battery Voltage for 5 seconds, and then 0 V
(IV): DC 4.75 ~ 5.15 V
(V): DC 5.75 ~ 6.15 V for 5 seconds, and then DC 4.75 ~ 5.15 V

★If the reading is out of the specification, check the wiring and KIPASS ECU (see KIPASS ECU Power Supply Inspection in the Electrical System chapter).
★If the wiring and KIPASS ECU are good, replace the steering lock unit.

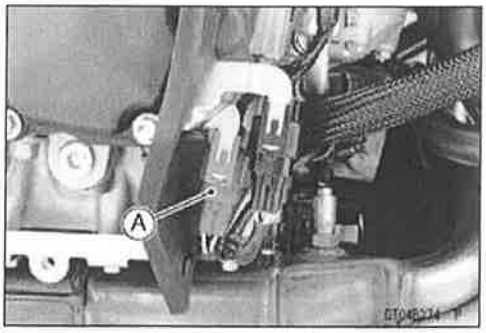
Oxygen Sensor #2 - not activated (Service Code 83)

Oxygen Sensor #2 Removal/Installation

- Refer to the Oxygen Sensor Removal/Installation in the Electrical System chapter.

Oxygen Sensor #2 Inspection

- Turn the key knob to "OFF."
- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Right Subframe (see Right Subframe Removal in the Frame chapter)
- Disconnect:
  Oxygen Sensor #2 Lead Connector (Gray) [A]

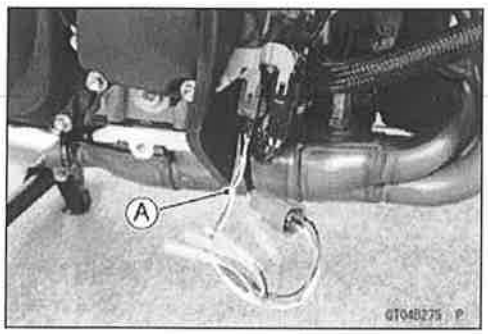


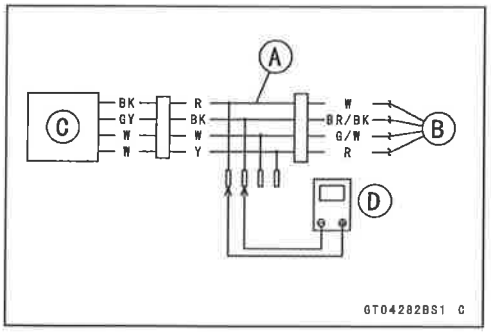
- Connect the measuring adapter [A] between the harness connector and oxygen sensor #2 lead connector as shown.
  Main Harness [B]
  Oxygen Sensor #2 [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.

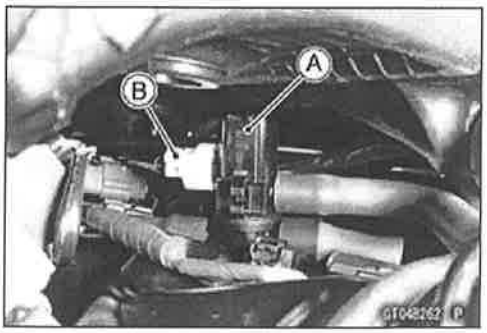
Oxygen Sensor #2 Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BK) lead
Digital Meter (−) → BK (sensor GY) lead





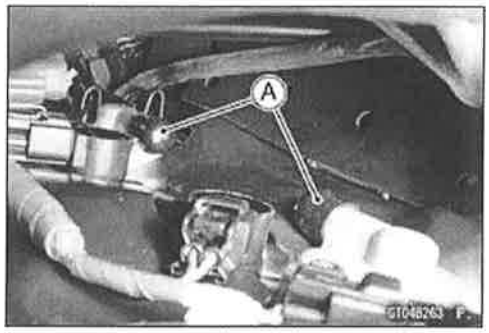
- Remove the air switching valve [A] (see Air Switching Valve Removal in the Engine Top End chapter).

○Do not disconnect the air switching valve connector [B].



Oxygen Sensor #2 - not activated (Service Code 83)

- Install the suitable plugs [A] on the fitting of the air suction valve covers, and shut off the secondary air.



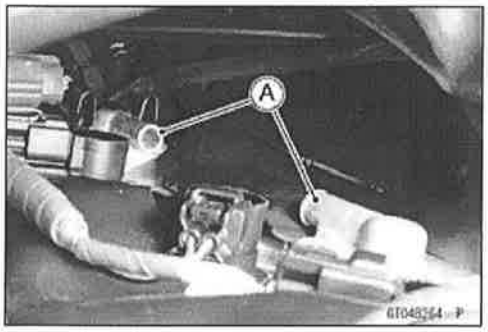
- Warm up the engine thoroughly until the radiator fan starts.
- Measure the output voltage with the connector joined.

Output Voltage (with Plugs)
Standard: DC 0.8 V or more

- Next, remove the plugs from the fittings [A] with idling.

⚠ WARNING

The engine gets extremely hot during normal operation and can cause serious burns. Never touch a hot engine.



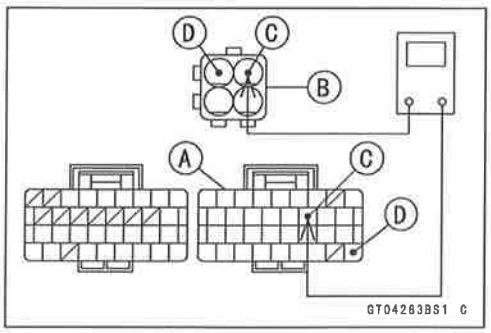
- Measure the output voltage with the connector joined.

Output Voltage (without Plugs)
Standard: DC 0.24 V or less

- Turn the key knob to "OFF."

★If the reading is out of the standard (with plugs: DC 0.8 V or more, without plugs: DC 0.24 V or less), remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.



Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor #2 Connector [B]
W lead (ECU terminal 46) [C]
BR/BK lead – BR lead (ECU terminal 60) [D]

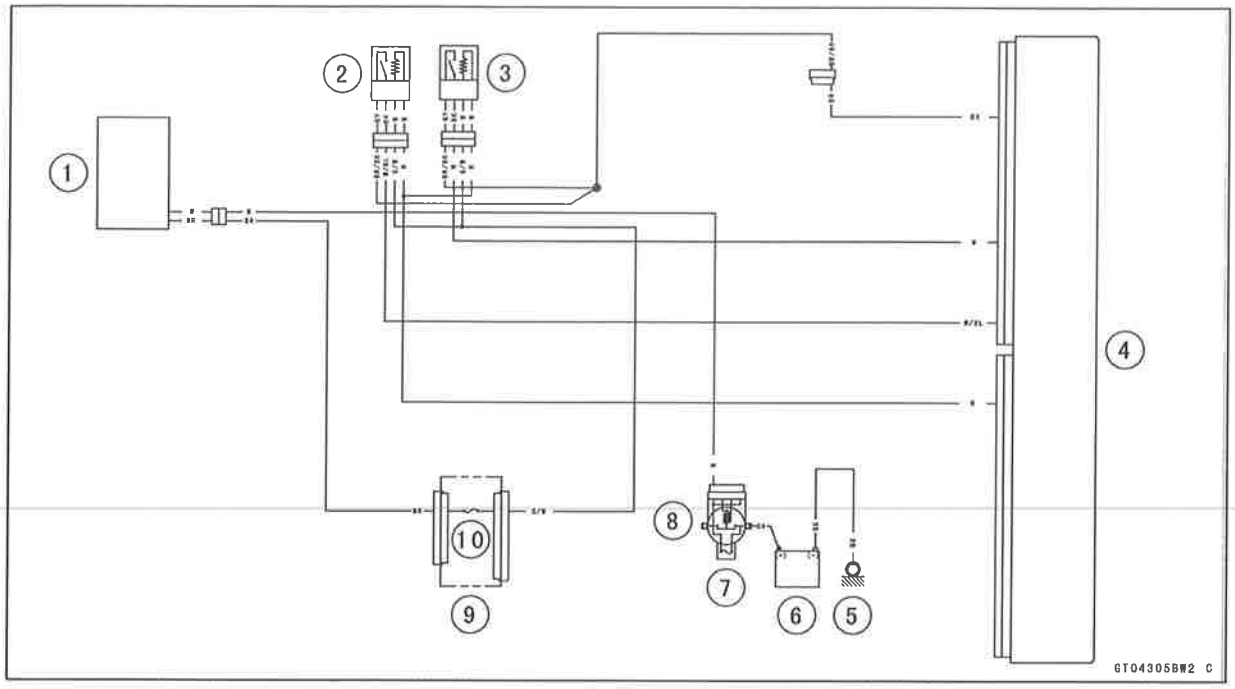
★If the wiring is good, replace the sensor.

★If the reading is within the standard (with plugs: DC 0.8 V or more, without plugs: DC 0.24 V or less), check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Oxygen Sensor #2 - not activated (Service Code 83)

Oxygen Sensor Circuit



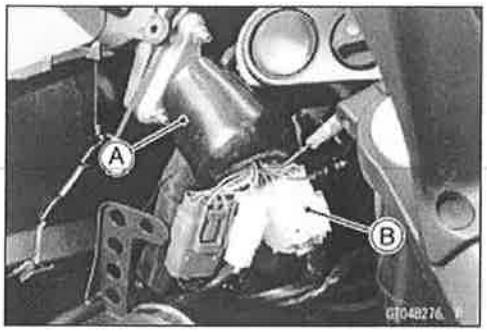
1. Steering Lock Unit
2. Oxygen Sensor #1
3. Oxygen Sensor #2
4. ECU
5. Frame Ground
6. Battery 12 V 14 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 3
10. Oil Control Solenoid Valve Fuse 15 A

KTRC Button (Service Code 89)

KTRC Button Inspection

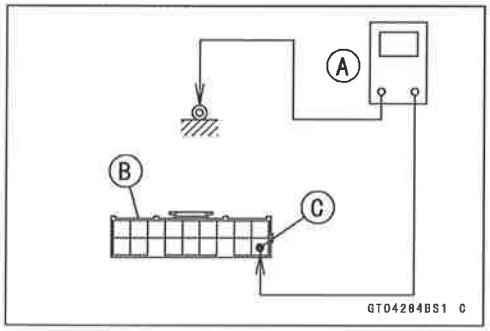
○When the KTRC button was pushed ON for more than 60 seconds, the service code 89 is displayed.
○In this case, release the KTRC button and wait for more than 10 seconds. Then, the service code 89 is not displayed (goes off).
○The KTRC button sends the signal voltage (0 V (ON) or 5 V (OFF)) to the meter unit, and then meter unit sends the data (status of KTRC button) to the ECU through the CAN communication line.
○The service code 89 is detected with the ECU.

• Refer to the Switch Inspection in the Electrical System chapter.
★If the KTRC button is normal, do the following inspection procedures.
• Remove the left inner cover (see Inner Cover Removal in the Frame chapter).
• Slide the dust cover [A] and free the left switch housing lead connector [B].



• Set a tester [A] and check the following wiring for continuity.

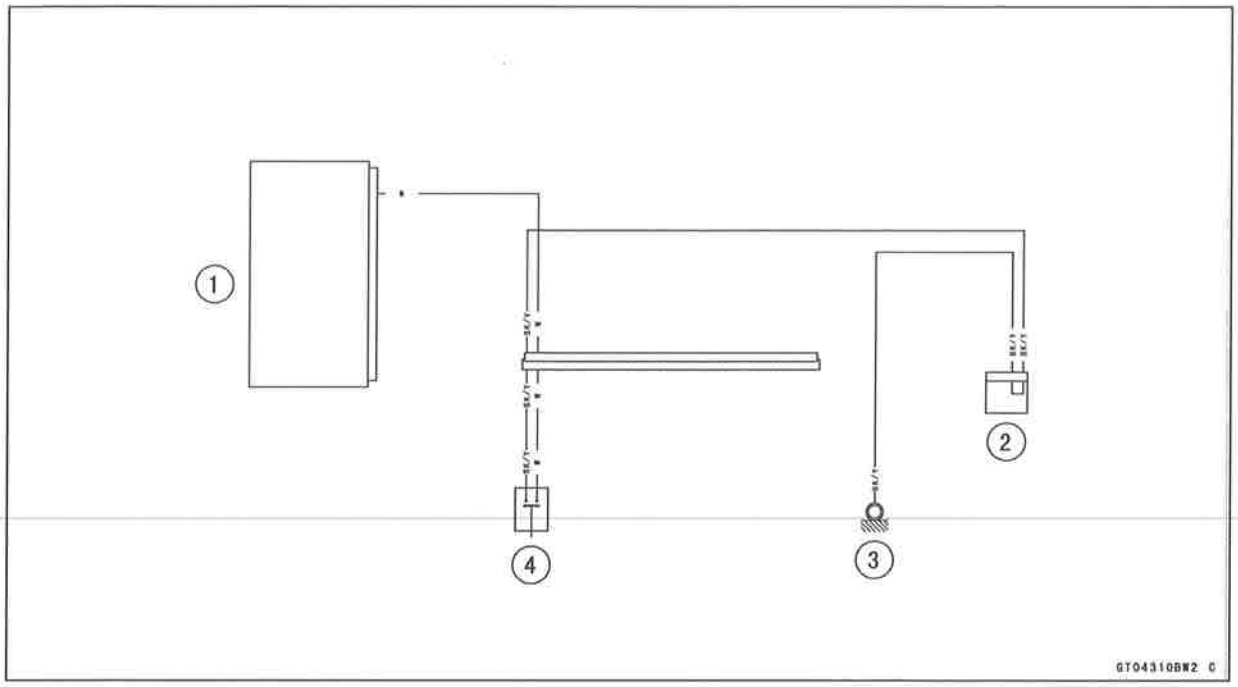
Wiring Continuity Inspection
Left Switch Housing Lead Connector (Main Harness Side) [B] ←→
Frame Ground Terminal
W lead [C]



★If there is continuity (0 Ω or any reading), wiring is short circuit. Repair or replace the main harness.
★If there is no continuity (infinity (∞) Ω), check the meter unit (see Meter Unit Inspection in the Electrical System chapter).
★If the meter unit is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

KTRC Button (Service Code 89)

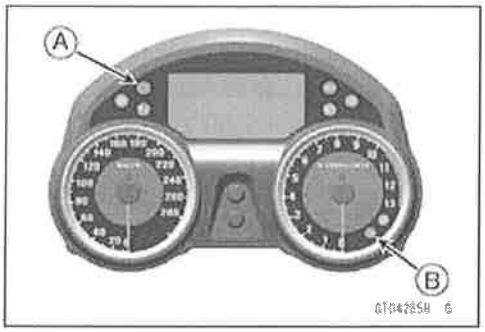
KTRC Button Circuit



1. Meter Unit
2. Joint Connector 8
3. Frame Ground
4. KTRC Button

Meter Unit and K-ACT ABS Hydraulic Unit Communication Error (Service Code 1A)

Meter Unit and K-ACT ABS Hydraulic Unit Communication Line Inspection



○When the data (for KTRC control) is not sent from the meter unit and K-ACT ABS hydraulic unit to the ECU, the service code 1A is displayed.
○The data is sent through the CAN communication line.
○The service code 1A is detected with the ECU.
○When the service code 1A was detected, the red warning indicator light (LED) [A] and yellow KTRC indicator light (LED) [B] go on, and KTRC warning message is displayed on the LCD.

- Inspect the CAN communication line (see CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter).

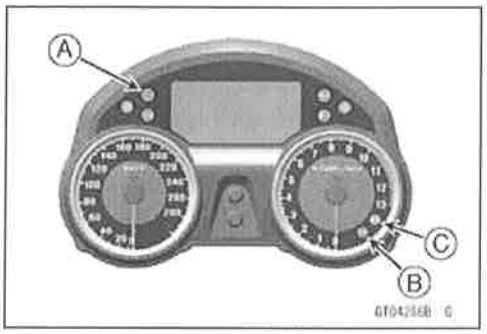
★If the CAN communication line is normal, check the following parts.
Meter Unit (see Meter Unit Inspection in the Electrical System chapter)
K-ACT ABS Hydraulic Unit (see K-ACT ABS Hydraulic Unit Inspection in the Brakes chapter)

★If the above parts are normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

K-ACT ABS Hydraulic Unit Communication Error (Service Code 1B)

K-ACT ABS Hydraulic Unit Communication Line Inspection



○When the data (for status of K-ACT ABS hydraulic unit) is not sent from the K-ACT ABS hydraulic unit to the meter unit and ECU, the service code 1B is displayed.
○The data is sent through the CAN communication line
○The service code 1B is detected with the meter unit.
○When the service code 1B was detected, the red warning indicator light (LED) [A], yellow KTRC indicator light (LED) [B] and yellow K-ACT ABS indicator light (LED) [C] go on, and KTRC warning message and K-ACT ABS warning message are alternately displayed on the LCD.

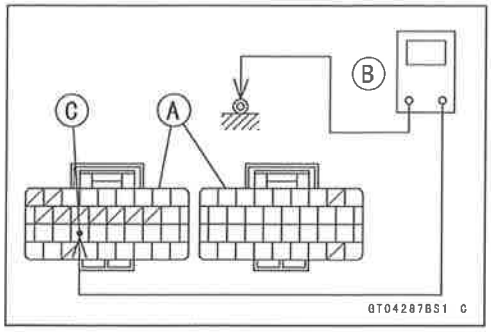
- Inspect the CAN communication line (see CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter).

★If the CAN communication line is normal, check the K-ACT ABS hydraulic unit (see K-ACT ABS Hydraulic Unit Inspection in the Brakes chapter).
★If the K-ACT ABS hydraulic unit is normal, check the meter unit (see Meter Unit Inspection in the Electrical System chapter).
★If the meter unit is normal, but the problem still exists, replace the meter unit (see Meter Unit Removal/Installation in the Electrical System chapter).

Ground Wiring (ECU Terminal 23) (Service Code 2C)

Ground Wiring (ECU Terminal 23) Inspection

○When the ground wiring (ECU terminal 23) is opened, the service code 2C is displayed.
○The service code 2C is detected with the ECU.

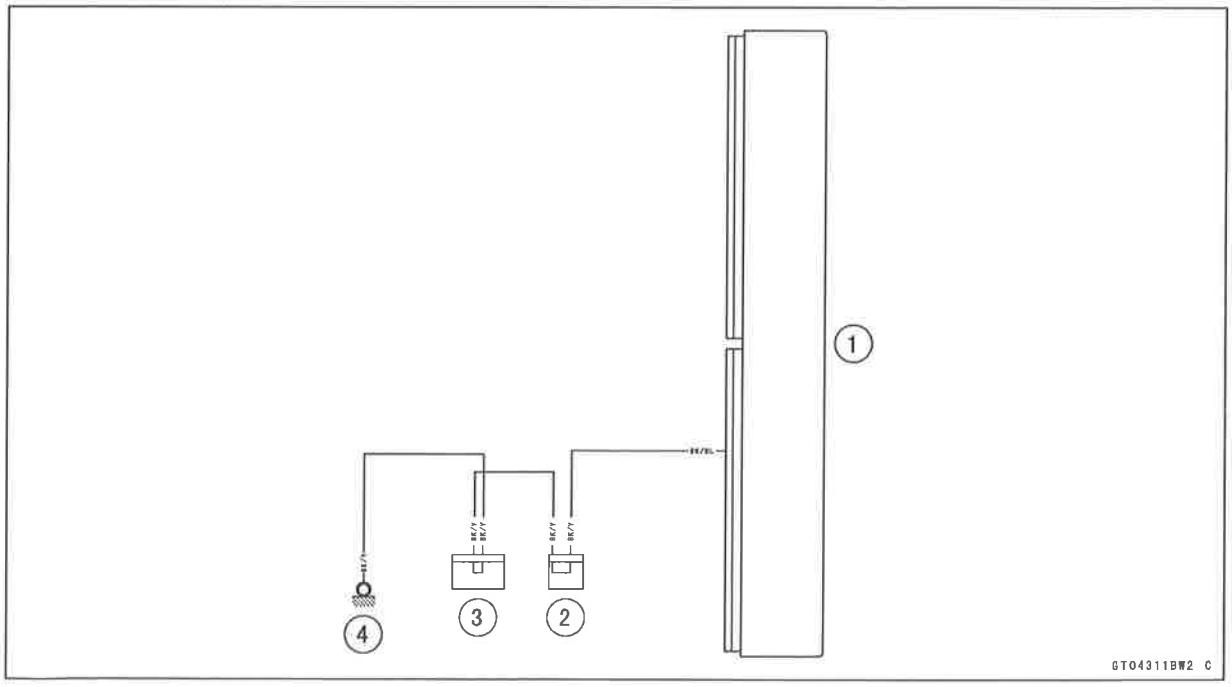


- Disconnect the ECU connectors [A] (see ECU Removal in the Fuel System (DFI) chapter).
- Set a tester [B] and check the following wiring for continuity.

Wiring Continuity Inspection
ECU Connector ←→ Frame Ground Terminal
BK/BL lead (ECU terminal 23) [C]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

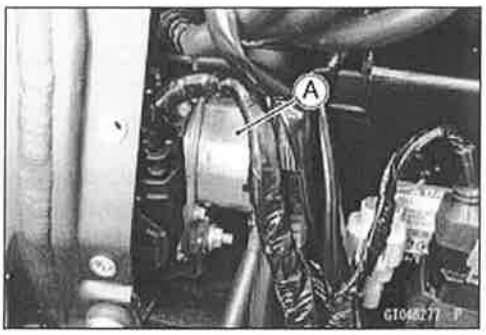
Ground Wiring (ECU terminal 23) Circuit



1. ECU
2. Joint Connector 3
3. Joint Connector 9
4. Frame Ground

K-ACT ABS Service Codes

Solenoid Valve Inspection (Service Code B 13, B 14, B 17, B 18)



○The solenoid valve is built in the K-ACT ABS hydraulic unit [A]. Therefore the solenoid valve cannot be checked directly.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If any of these service codes appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

K-ACT ABS Solenoid Valve Relay Inspection (Service Code B 19)

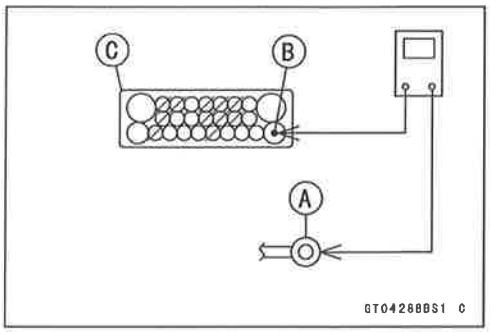
- Check the K-ACT ABS solenoid valve relay fuse (20 A) [A] (see Fuse Inspection in the Electrical System chapter).

★If the fuse is good, check the wiring continuity as follows.

○Disconnect:

Battery Positive Cable (see Battery Removal in the Electrical System chapter)

K-ACT ABS Hydraulic Unit Connector (see K-ACT ABS Hydraulic Unit Removal)



○Check the wiring continuity between the positive cable terminal [A] of the battery and R/W lead terminal [B] in the K-ACT ABS hydraulic unit connector [C].

★If the wiring is open, replace or repair harness (see K-ACT ABS System Circuit in the Brakes chapter).

★If the wiring is good, go to next step.

○The K-ACT ABS solenoid valve relay is built in the K-ACT ABS hydraulic unit. Therefore the relay cannot be checked directly.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Front Combine Valve Inspection (Service Code B 21, B 22)

○The front combine valve is built in the K-ACT ABS hydraulic unit. Therefore the front combine valve cannot be checked directly.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If any of these service codes appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

K-ACT ABS Service Codes

Front, Rear Wheel Rotation Difference Abnormal Inspection (Service Code B 25)

- Check the following and correct the faulty part.
  Incorrect Tire Pressure
  Tires not recommended for the motorcycle were installed (incorrect tire size).
  Deformation of Wheel or Tire
  Missing Teeth or Clogging with Foreign Matter of Sensor Rotor (see Wheel Rotation Sensor Rotor Inspection in the Brakes chapter)

★If the all parts corrected, go to next step.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

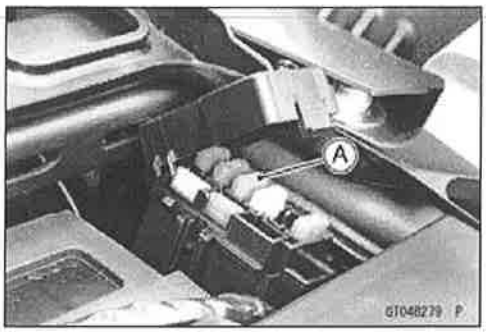
★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

K-ACT ABS Motor Relay Inspection (Service Code B 35)

- Check the K-ACT ABS motor relay fuse (30 A) [A] (see Fuse Inspection in the Electrical System chapter).

★If the fuse is good, check the wiring continuity as follows.

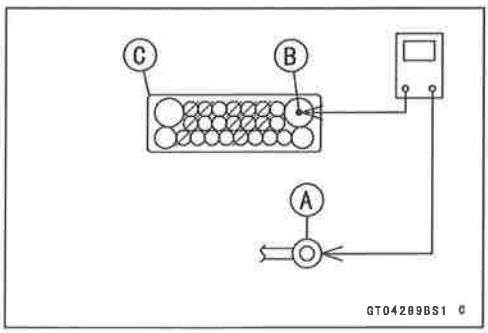
○Disconnect:
  Battery Positive Cable (see Battery Removal in the Electrical System chapter)
  K-ACT ABS Hydraulic Unit Connector (see K-ACT ABS Hydraulic Unit Removal)



○Check the wiring continuity between the positive cable terminal [A] of the battery and R/W lead terminal [B] in the K-ACT ABS hydraulic unit connector [C].

★If the wiring is open, replace or repair the harness (see K-ACT ABS System Circuit in the Brakes chapter).

★If the wiring is good, go to next step.



○The K-ACT ABS motor relay is built in the K-ACT ABS Hydraulic Unit. Therefore the relay cannot be checked directly.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Front Wheel Rotation Sensor Signal Abnormal (Service Code B 42)

- Measure the air gap between the front wheel rotation sensor and sensor rotor (see Wheel Rotation Sensor Inspection in the Brakes chapter).

★If the air gap is good, go to next step.

K-ACT ABS Service Codes

- Check that there is iron or other magnetic deposits between the sensor and sensor rotor, and the sensor rotor slots for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor and sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).

★If the sensor and sensor rotor in bad condition, remove the any deposits. Install the proper part or replace faulty part.

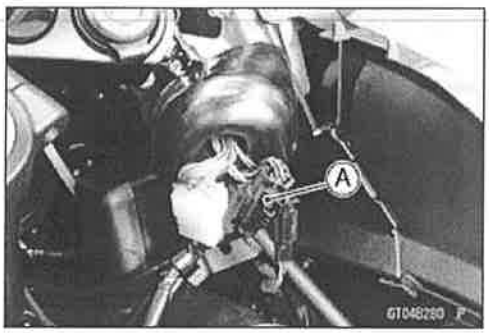
★If the all items are good, go to next step.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

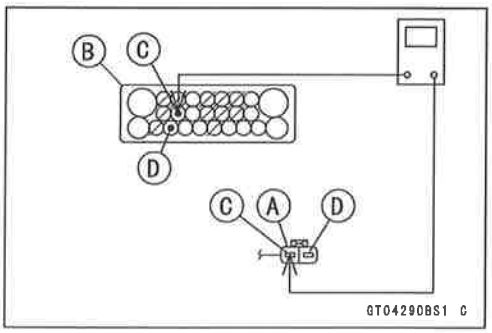
★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Front Wheel Rotation Sensor Wiring Inspection (Service Code B 43)

- Disconnect the front wheel rotation sensor lead connector [A] (see Front Wheel Rotation Sensor Removal in the Brakes chapter).



- Disconnect the K-ACT ABS hydraulic unit connector (see K-ACT ABS Hydraulic Unit Removal).
- Check the wiring continuity of the G lead and BK/R lead.
  Front Wheel Rotation Sensor Lead Connector [A]
  K-ACT ABS Hydraulic Unit Connector [B]
  G Lead Terminals [C]
  BK/R Lead terminals [D]



★If the wiring is open, replace or repair the harness (see K-ACT ABS System Circuit in the Brakes chapter).

★If the wiring is good, go to next step.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the front wheel rotation sensor (see Front Wheel Rotation Sensor Removal in the Brakes chapter).

- Still, when it is not good, replace the K-ACT ABS hydraulic unit.

Rear Wheel Rotation Sensor Signal Abnormal (Service Code B 44)

- Measure the air gap between the rear wheel rotation sensor and sensor rotor (see Wheel Rotation Sensor Inspection in the Brakes chapter).

★If the air gap is good, go to next step.

K-ACT ABS Service Codes

- Check that there is iron or other magnetic deposits between the sensor and sensor rotor, and the sensor rotor slots for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor and sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).

★If the sensor and sensor rotor in bad condition, remove the any deposits. Install the proper part or replace faulty part.

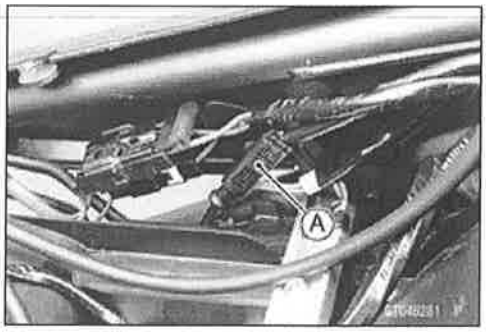
★If the all items are good, go to next step.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Rear Wheel Rotation Sensor Wiring Inspection (Service Code B 45)

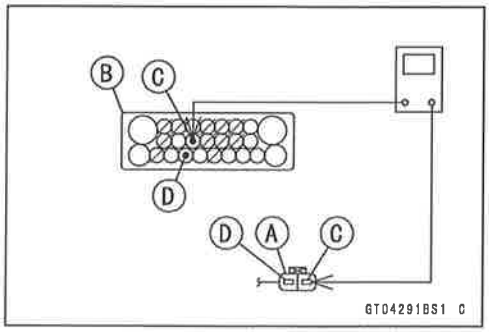
- Disconnect the rear wheel rotation sensor lead connector [A] (see Rear Wheel Rotation Sensor Removal in the Brakes chapter).



- Disconnect the K-ACT ABS hydraulic unit connector (see K-ACT ABS Hydraulic Unit Removal in the Brakes chapter).
- Check the wiring continuity of the BK lead and W/R lead.
  Rear Wheel Rotation Sensor Lead Connector [A]
  K-ACT ABS Hydraulic Unit Connector [B]
  BK Lead Terminals [C]
  W/R Lead terminals [D]

★If the wiring is open, replace or repair the harness (see K-ACT ABS System Circuit in the Brakes chapter).

★If the wiring is good, go to next step.



- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the rear wheel rotation sensor (see Rear Wheel Rotation Sensor Removal in the Brakes chapter).

- Still, when it is not good, replace the K-ACT ABS hydraulic unit.

Power Supply Voltage Inspection (Low-Voltage) (Service Code B 52)

- Check the battery condition (see Charging Condition Inspection in the Electrical System chapter).

★If the battery is good condition, perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

K-ACT ABS Service Codes

Power Supply Voltage Inspection (Over-Voltage) (Service Code B 53)

- Check the charging voltage (see Charging Voltage Inspection in the Electrical System chapter).

★If the charging voltage is good, perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

K-ACT ABS Solenoid Valve Relay Supply Voltage Inspection (Low-Voltage) (Service Code B 54)

- Check the battery condition (see Charging Condition Inspection in the Electrical System chapter).

★If the battery is good condition, perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

ECU Inspection (Service Code B 55)

○This ECU is built in the K-ACT ABS hydraulic unit. Therefore the ECU cannot be checked directly.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

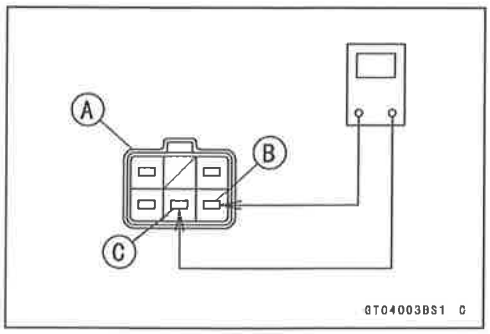
★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

CAN Bus OFF Monitor Inspection (Service Code B 57)
K-ACT ABS Button Signal CAN Monitor (Service Code B 58)

- Remove:
  Seat (see Seat Removal in the Frame chapter)
  Kawasaki Diagnostic System Connector Cap [A]

- Measure the CAN communication line resistance.
  Kawasaki Diagnostic System Connector [A]
  GY/BL Terminal [B]
  LB Terminal [C]

CAN Communication Line Resistance
Standard: 30 ~ 70 Ω



★If the reading is out of the standard, go to Check 1.

★If the reading is the standard, go to Check 2.

K-ACT ABS Service Codes

Check 1:

- Check the CAN communication line resistance of following parts.
  Meter Unit (see Meter Unit Inspection in the Electrical System chapter)
  ECU (see CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter)

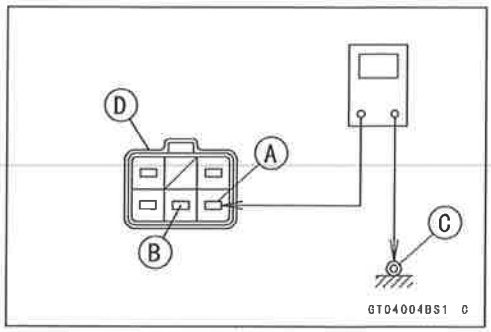
★If each resistance is good, check the wiring for continuity, using the wiring diagram (see K-ACT ABS System Circuit in the Brakes chapter).

★If the wiring is good, go to next step.

Check 2:

- Measure the resistance between the GY/BL [A] or LB [B] terminal and ground [C].
  Kawasaki Diagnostic System Connector [D]

CAN Communication Line/Ground Resistance
Standard: 5 ~ 30 kΩ



★If the reading is out of the standard, replace or repair the main harness.

★If the reading is the standard, go to next step.

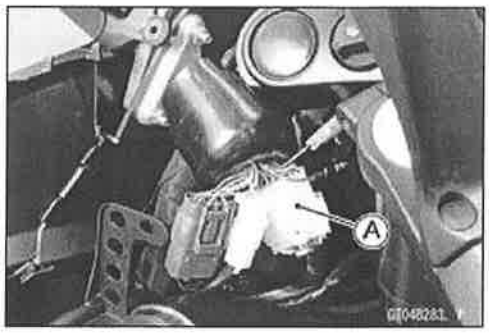
- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

K-ACT ABS Button Short Inspection (Service Code B 59)

- Remove:
  Left Inner Cover (see Left Inner Cover Removal in the Frame chapter)
- Disconnect:
  Left Handlebar Switch Housing Lead Connector [A]
- Check the K-ACT ABS button (see Switch Inspection in the Electrical System chapter).

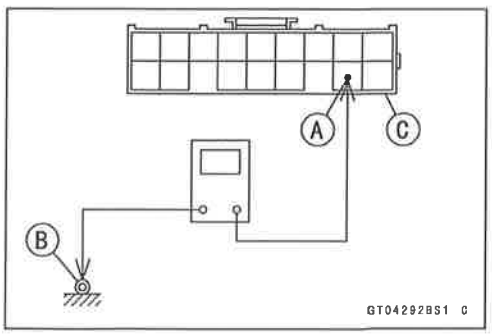
★If the button is good, check the wiring as follows.



- Check the continuity between the R lead terminal [A] and ground [B].
  Left Handlebar Switch Housing Lead Connector [C] of Main Harness

★If the R lead and ground is short, replace or repair the harness.

★If the R lead and ground is no continuity, go to next step.



- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If any of these service codes appear even if all checks are ended, replace the K-ACT ABS hydraulic unit.

K-ACT ABS Service Codes

High Pressure Switching/Switching Valve Inspection (Service Code B 71, B 72, B 73, B 74)

○The high pressure switching valve and switching valve are built in the K-ACT ABS hydraulic unit. Therefore they cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If any of these service codes appear even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Input Fluid Pressure Sensor (Front Brake) Wiring Inspection (Service Code B 81)

○The input fluid pressure sensor is built in the K-ACT ABS hydraulic unit. Therefore the sensor cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Input Fluid Pressure Sensor (Front Brake) Offset Abnormal (Service Code B 82)

○The input fluid pressure sensor is built in the K-ACT ABS hydraulic unit. Therefore the sensor cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Output Fluid Pressure Sensor (Front Brake) Wiring Inspection (Service Code B 83)

○The output fluid pressure sensor is built in the K-ACT ABS hydraulic unit. Therefore the sensor cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Output Fluid Pressure Sensor (Front Brake) Offset Abnormal (Service Code B 84)

○The output fluid pressure sensor is built in the K-ACT ABS hydraulic unit. Therefore the sensor cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

K-ACT ABS Service Codes

Input Fluid Pressure Sensor (Rear Brake) Wiring Inspection (Service Code B 85)

○The input fluid pressure sensor is built in the K-ACT ABS hydraulic unit. Therefore the sensor cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Input Fluid Pressure Sensor (Rear Brake) Offset Abnormal (Service Code B 86)

○The input fluid pressure sensor is built in the K-ACT ABS hydraulic unit. Therefore the sensor cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Output Fluid Pressure Sensor (Rear Brake) Wiring Inspection (Service Code B 87)

○The output fluid pressure sensor is built in the K-ACT ABS hydraulic unit. Therefore the sensor cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Output Fluid Pressure Sensor (Rear Brake) Offset Abnormal (Service Code B 88)

○The output fluid pressure sensor is built in the K-ACT ABS hydraulic unit. Therefore the sensor cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Fluid Pressure Sensor Supply Voltage Inspection (Service Code B 89)

○The fluid pressure sensors are built in the K-ACT ABS hydraulic unit. Therefore the voltage cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

K-ACT ABS Service Codes

Front Fluid Pressure Sensor Signal Inspection (Service Code B 91)

○The front fluid pressure sensor is built in the K-ACT ABS hydraulic unit. Therefore the signal cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Rear Fluid Pressure Sensor Signal Inspection (Service Code B 92)

○The rear fluid pressure sensor is built in the K-ACT ABS hydraulic unit. Therefore the signal cannot be checked directly.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the K-ACT ABS hydraulic unit.

Warning Messages

Warning Message Table

Message	Symbol	Indicator Lights (LED)	Problems	Action or Remarks
FI ERROR	FI	goes on	FI System Trouble	Indicate the service code (see Service Code Reading). Check the item according to the title of the service code.
IMMOBILIZER ERROR		goes on	Immobilizer System Trouble	Indicate the service code (see Service Code Reading). Check the item according to the title of the service code.
STEERING LOCK ERROR		goes on	Steering Lock Unit Trouble	Indicate the service code (see Service Code Reading). Check the item according to the title of the service code.
KTRC ERROR		goes on	KTRC System Trouble	Indicate the service code (see Service Code Reading). Check the item according to the title of the service code.
K-ACT ABS ERROR		goes on	K-ACT ABS Trouble	Indicate the service code (see Service Code Reading). Check the item according to the title of the service code.
TIRE PRESSURE SENSOR : F LOW BATTERY		–	The battery voltage of the front tire air pressure sensor is low.	Replace the front tire air pressure sensor (see Tire Removal/Installation in the Wheels/Tires chapter).
TIRE PRESSURE SENSOR : R LOW BATTERY		–	The battery voltage of the rear tire air pressure sensor is low.	Replace the rear tire air pressure sensor (see Tire Removal/Installation in the Wheels/Tires chapter).
TIRE PRESSURE SENSOR : F ERROR		goes on	Front Tire Pressure Sensor Trouble	Replace the front tire air pressure sensor (see Tire Removal/Installation in the Wheels/Tires chapter).
TIRE PRESSURE SENSOR : R ERROR		goes on	Rear Tire Pressure Sensor Trouble	Replace the rear tire air pressure sensor (see Tire Removal/Installation in the Wheels/Tires chapter).
LOW BATTERY		–	Battery voltage is low.	Charge the battery (see Refreshing Charge in the Electrical System chapter).
NO TRANSPONDER		goes on	When the key knob is "OFF" from "ON," the FOB is not near the motorcycle or battery voltage of the transponder is discharged.	If the FOB is lost, the re-registration of the keys are recommended.

Warning Messages

Message	Symbol	Indicator Lights (LED)	Problems	Action or Remarks
NO TRANSPONDER	–	goes on	When the engine is running, the FOB is not near the motorcycle or battery voltage of the transponder is discharged.	If the FOB is lost, the re-registration of the keys are recommended.
STEERING LOCK ID ERROR		blinks	The steering lock unit is not correctly authenticated.	Register the steering lock unit, using the Kawasaki Diagnostic System (KDS ver.3).
ECU ID ERROR		blinks	The ECU is not correctly authenticated.	Register the ECU, using the Kawasaki Diagnostic System (KDS ver.3).
SUBKEY ID ERROR		blinks	The sub-key of the other motorcycle is used or the transponder is not registered.	Check that the serial numbers of the FOB and KIPASS ECU are agreement.
TRANSPONDER REGISTRATION ERROR	–	blinks	The transponder authentication cannot be registered.	Proceed work according to Kawasaki Diagnostic System (KDS ver.3).
STEERING LOCK REGISTRATION ERROR	–	blinks	The steering lock unit authentication number cannot be registered.	Proceed work according to Kawasaki Diagnostic System (KDS ver.3).
ECU REGISTRATION ERROR	–	blinks	The ECU authentication number cannot be registered.	Proceed work according to Kawasaki Diagnostic System (KDS ver.3).
TRANSPONDER REGISTRATION OK-CHANGE	–	–	The FOB registered first is not near the steering lock unit.	Proceed work according to Kawasaki Diagnostic System (KDS ver.3). Place the first registered FOB near the steering lock unit.

- For other messages, refer to Meter Operation Inspection and Meter System Inspection in the Electrical System chapter.

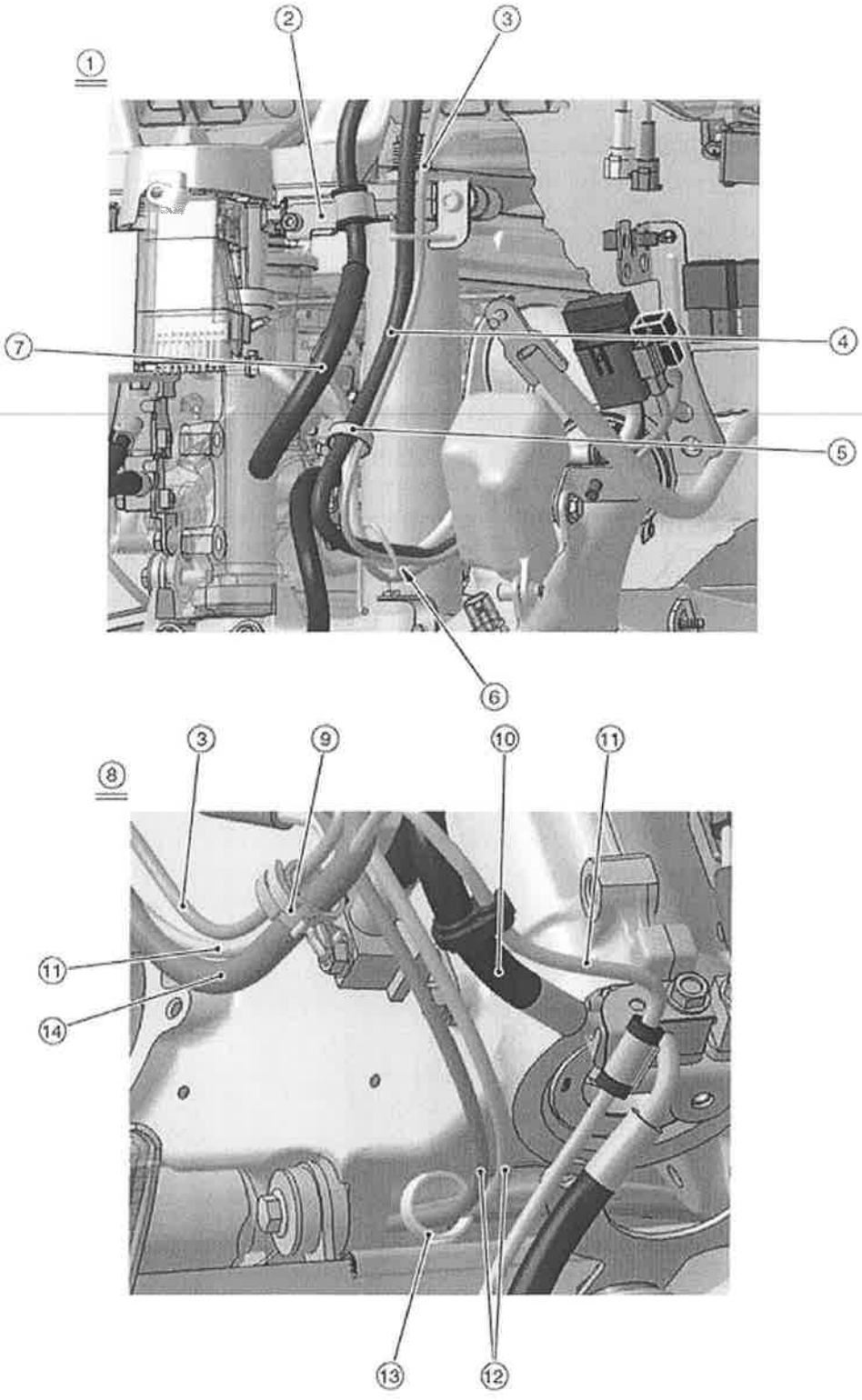
○The registration can work by using the Kawasaki Diagnostic System (KDS ver.3).

Appendix

Table of Contents

Cable, Wire, and Hose Routing 18-2
Troubleshooting Guide 18-69

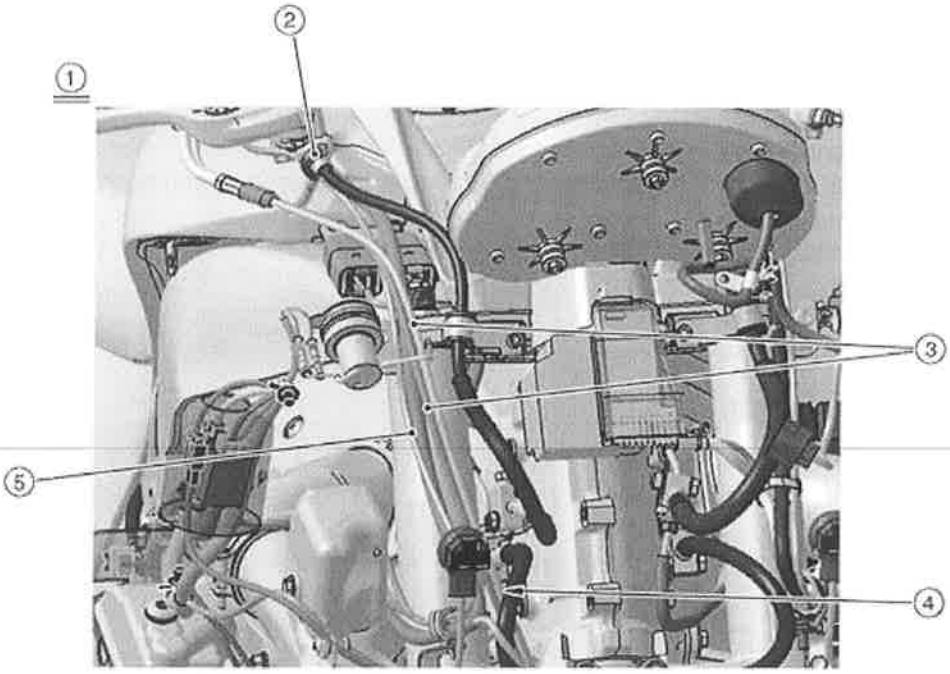
Cable, Wire, and Hose Routing

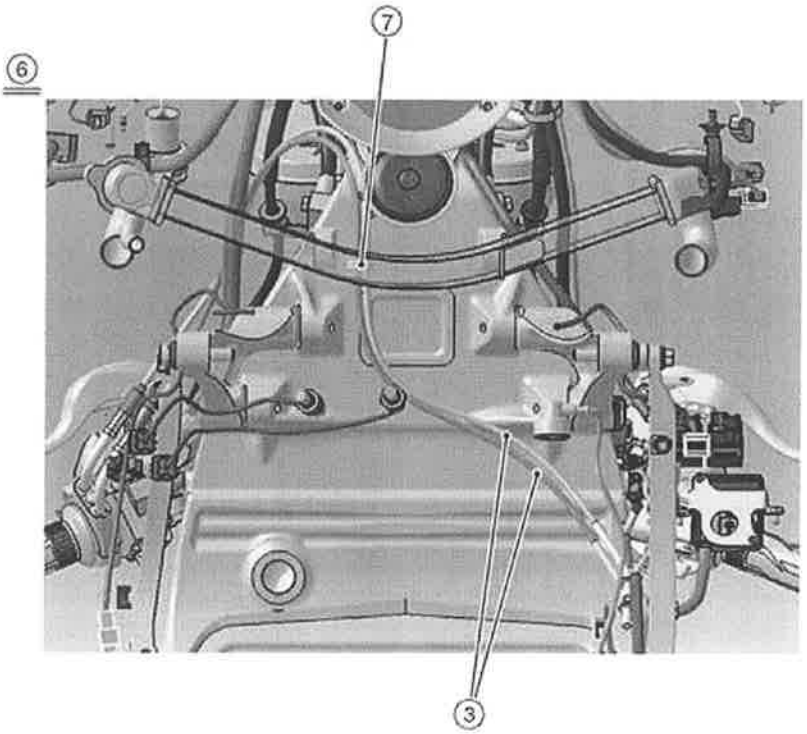


Cable, Wire, and Hose Routing

1. Left of the Head Pipe
2. Clamp (Hold the clutch hose.)
3. Grip Warmer Lead
4. Left Switch Housing Lead
5. Clamp (Hold the left switch housing lead, left grip warmer lead and steering lock unit lead.)
6. Run the left switch housing lead, grip warmer lead and steering lock unit lead into the guide.
7. Clutch Hose
8. Front of the Head Pipe
9. Clamp (Hold the right switch housing lead, right grip warmer lead and horn lead.)
10. Brake Hose
11. Front Wheel Rotation Sensor Lead
12. Throttle Cables
13. Clamp (Hold the throttle cables.)
14. Right Switch Housing Lead

Cable, Wire, and Hose Routing





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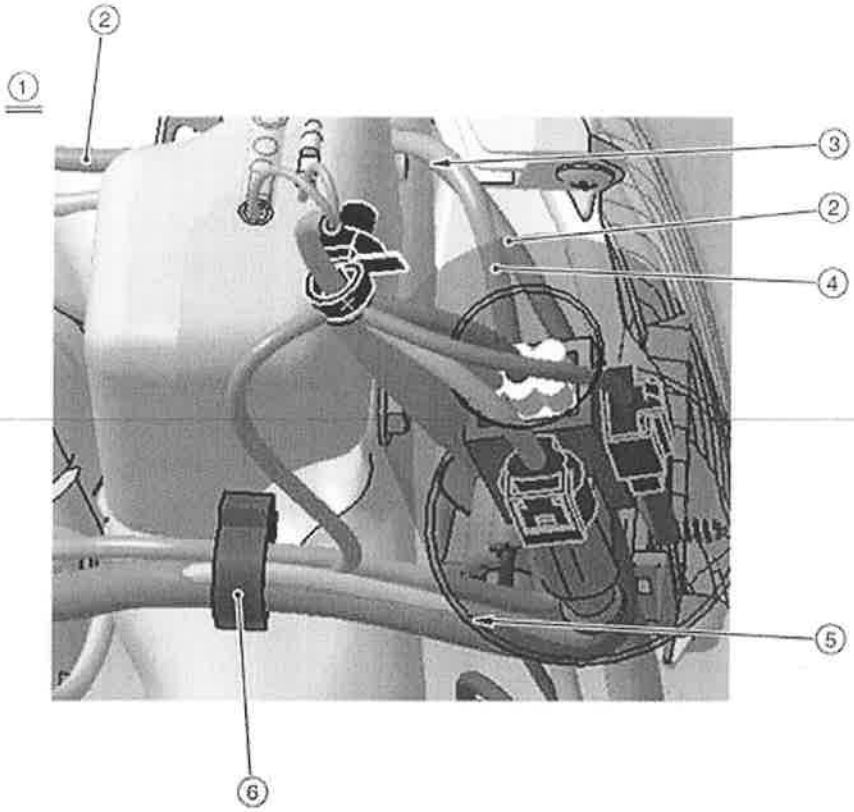
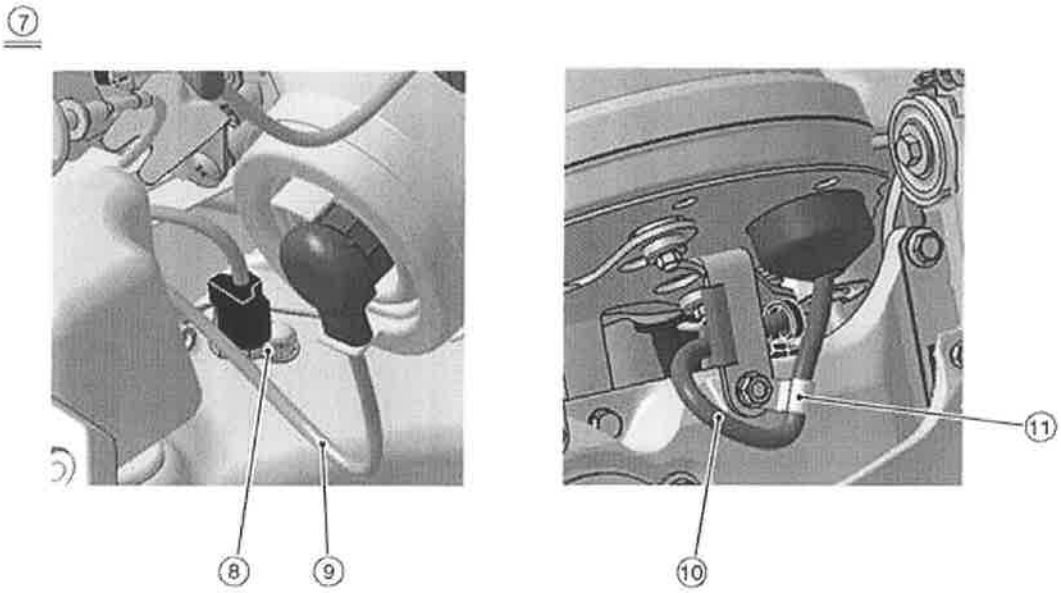
Cable, Wire, and Hose Routing

1. Right of the Head Pipe
2. Clamp (Hold the brake hose and right grip warmer lead at the brake hose end as shown.)
3. Throttle Cables
4. Run the throttle cables between the front fork and brake hose.
5. Right Grip Warmer Lead
6. Lower Side of the Head Pipe
7. Run the throttle cables into the clamp on the radiator cover.

Cable, Wire, and Hose Routing

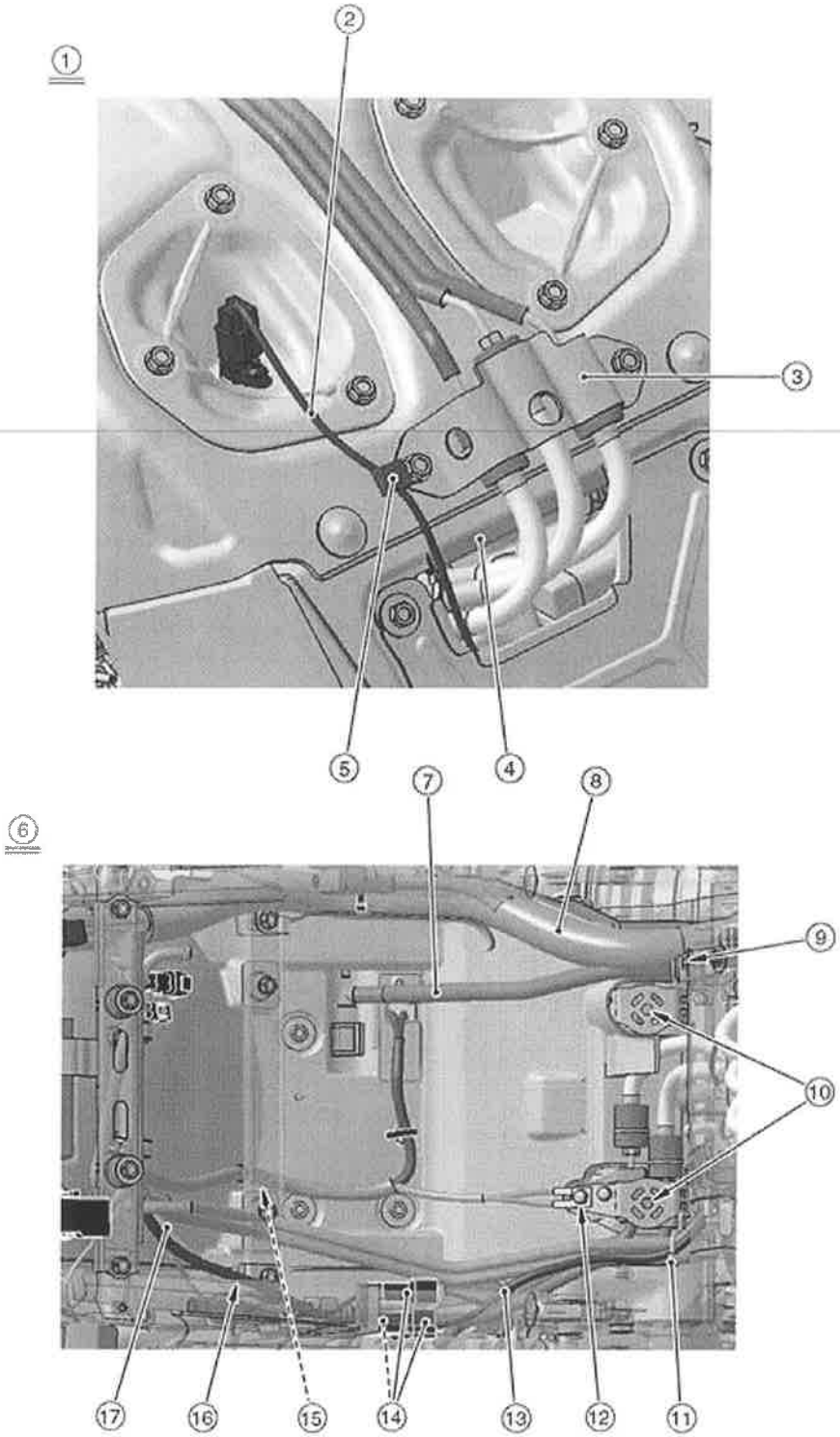




Cable, Wire, and Hose Routing

1. Headlight
2. Right City Light Lead
3. Run the headlight lead and right city light lead between the resonator and the headlight.
4. Headlight Lead
5. Run the front wheel rotation sensor lead, right switch housing lead, horn lead and right grip warmer lead to the inside of the fairing bracket.
6. Run the front wheel rotation sensor lead, right switch housing lead, horn lead and right grip warmer lead into the clamp (Tighten the clamp completely.).
7. Front of Meter
8. Outside Temperature Sensor
9. Run the headlight lead to the back of the outside temperature sensor.
10. Run the meter lead to the front of the bracket.
11. Clamp (Hold the meter lead.)

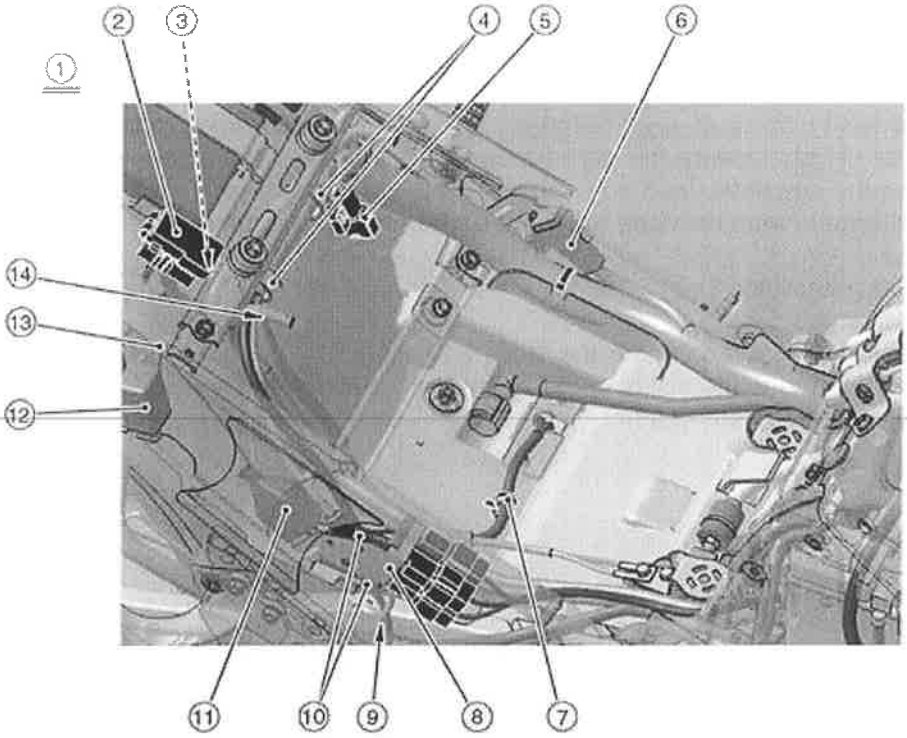
Cable, Wire, and Hose Routing

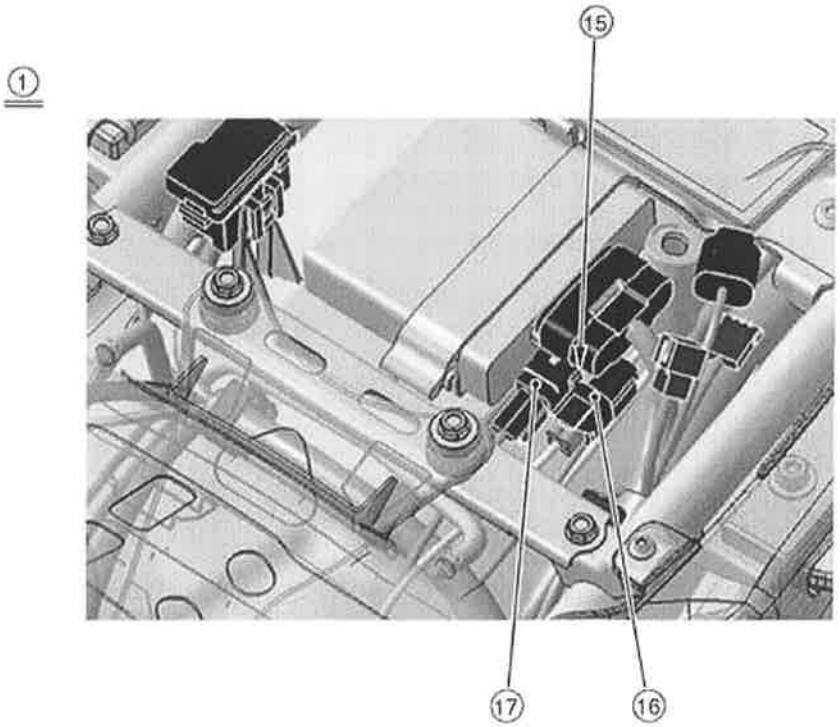


Cable, Wire, and Hose Routing

1. Intake Air Temperature Sensor
2. Intake Air Temperature Sensor Lead
3. Bracket (For Brake Pipes)
4. Install the trim seal to the frame.
5. Clamp (Hold the intake air temperature sensor lead.)
6. Under the Fuel Tank
7. Fuel Hose
8. Main Harness
9. Align the center of gray tape on the main harness with the edge of the battery case.
10. Do not position the any hose, lead and harness on the bracket under the fuel tank.
11. Position the alternator lead between the frames when the lead remain.
12. Frame Ground
13. Alternator Lead (Alternator Side)
14. Alternator Connectors
15. Run the regulator/rectifier lead under the cross bracket.
16. Run the alternator lead to the inside of the rear wheel rotation sensor lead.
17. Rear Wheel Rotation Sensor Lead

Cable, Wire, and Hose Routing

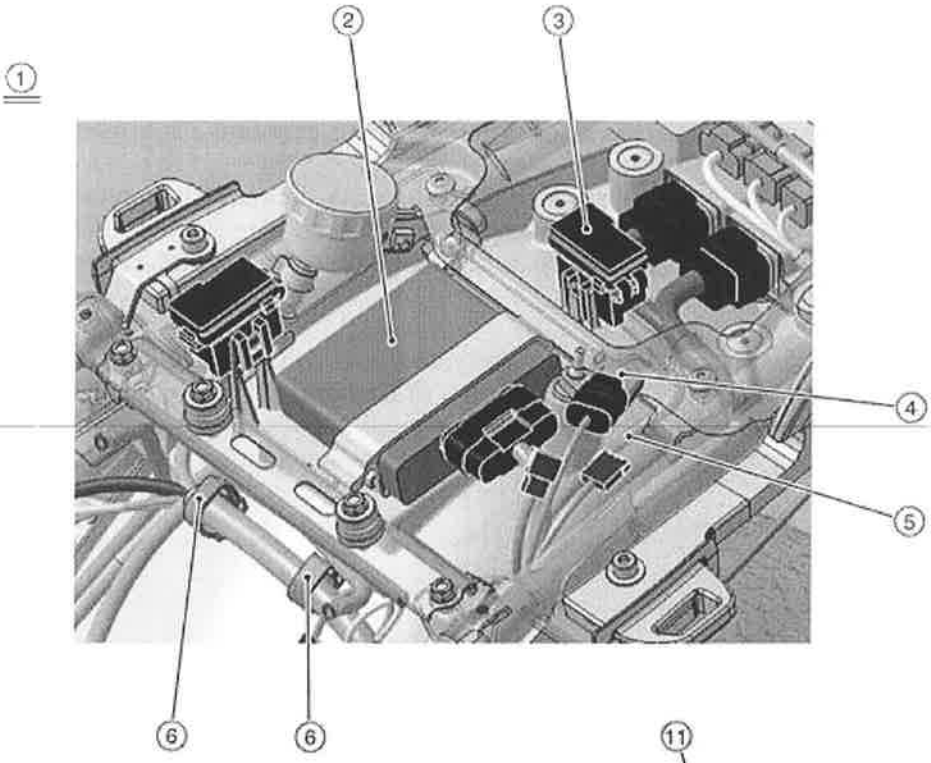


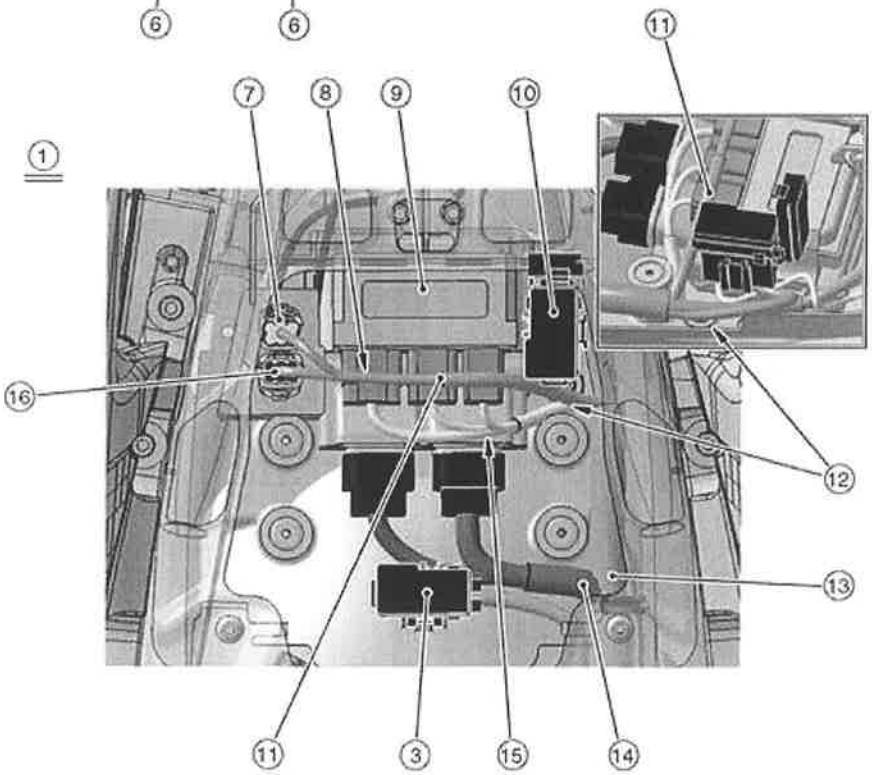


Cable, Wire, and Hose Routing

1. Under the Fuel Tank
2. Fuse Box 1
3. Run the fuse box 1 lead under the cross bracket.
4. Clamps
5. Fuel Level Sensor Lead Connector
6. Insert the fuse to the bracket.
7. Insert the clamp on the regulator/rectifier lead to the rear fender.
8. Insert the connectors of the rear wheel rotation sensor, rear brake light switch and alternator to the bracket.
9. Run the rear wheel rotation sensor lead and rear brake light switch lead through the clamp.
10. Install the trim seals for harness protection.
11. After fixing the rear brake light switch lead connector to the bracket, cover the connector with the water-proof cover.
12. Turn Signal Relay
13. Run the turn signal relay lead between the rear frame and rear fender.
14. Run the rear wheel rotation sensor lead, rear brake light switch lead and alternator lead to the upside of the any hoses.
15. Position the fuel pump lead connector and fuel level sensor lead connector under the KIPASS ECU connector.
16. Fuel Pump Lead Connector
17. Fuel Level Sensor Lead Connector

Cable, Wire, and Hose Routing





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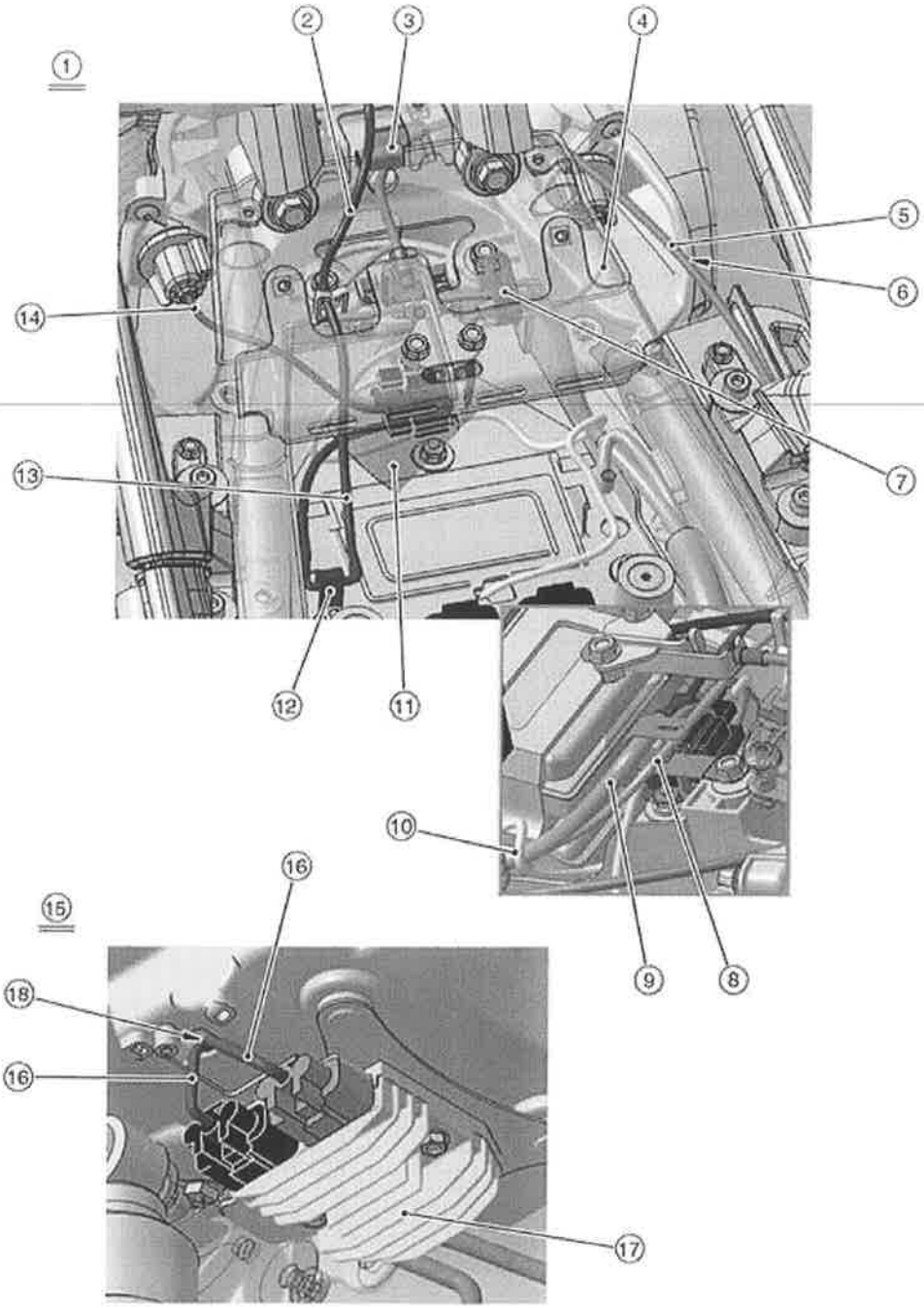
Cable, Wire, and Hose Routing

1. Under the Seat
2. KIPASS ECU
3. Fuse Box 3
4. Atmospheric Pressure Sensor
5. Run the fuse box 3 lead to the outside of the atmospheric pressure sensor.
6. Clamps (Hold the main harness with the clamp opening facing backward.)
7. Kawasaki Diagnostic System Connector
8. Do not contact the relay box connectors and tool case.
9. Relay Box
10. Fuse Box 2
11. Run the Kawasaki diagnostic system connector lead under the tool case. Do not pinch the Kawasaki diagnostic system lead in the tool case.
12. Run the relay box lead under the Kawasaki diagnostic system connector lead.
13. Main Harness
14. ECU Lead
15. Relay Box Leads
16. K-ACT ABS Kawasaki Diagnostic System Connector

Cable, Wire, and Hose Routing



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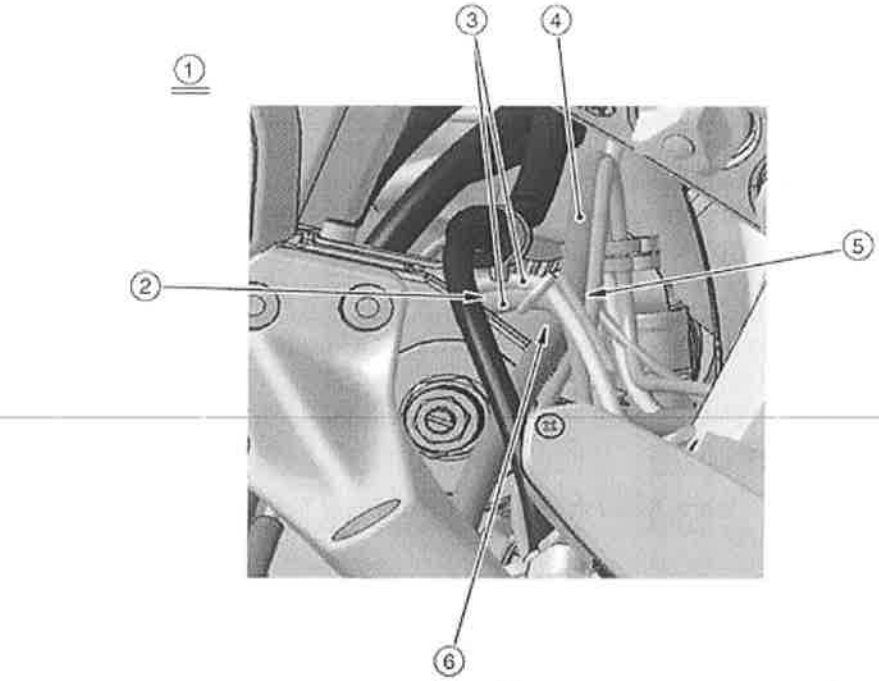
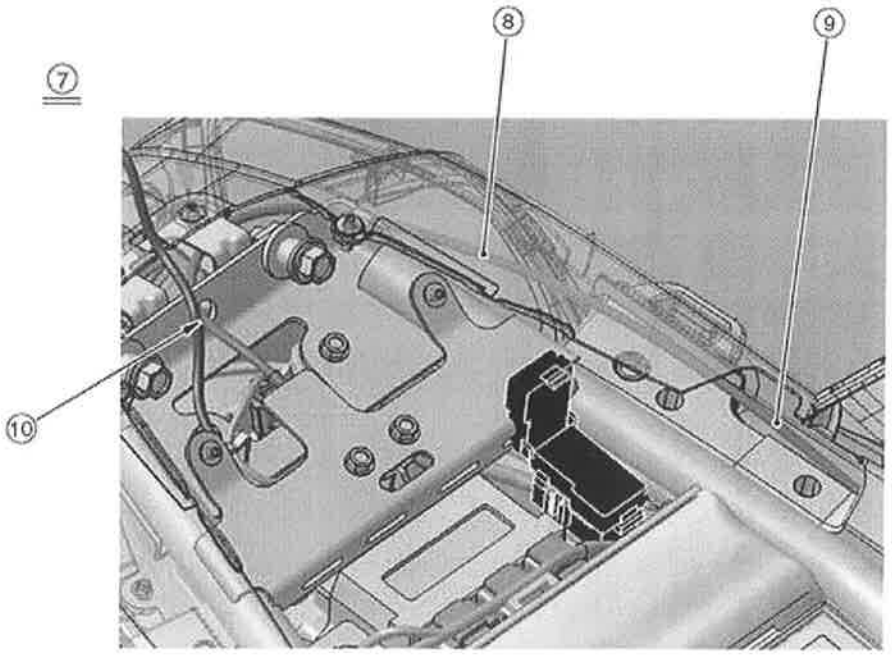
Cable, Wire, and Hose Routing

1. Under the Seat
2. Tail/Brake Light Lead and Vehicle-down Sensor Lead
3. Preface to the right side to install the trim seal for harness protection.
4. Rear Left Turn Signal Light Lead
5. Seat Lock Cable
6. Run the seat lock cable over the rear left turn signal light lead.
7. Clamp (Hold the turn signal light leads and vehicle-down sensor lead.)
8. Run the vehicle-down sensor lead to the back of the main harness.
9. Main Harness
10. Run the license plate light lead over the main harness.
11. After connecting the connectors of the tail/brake light, rear right turn signal light and license plate light, place the water-proof cover under the seat lock after putting the connectors into the water-proof cover.
12. Clamp (Hold the tail/brake light lead.)
13. Tail/Brake Light Lead (Do not pinch lead between the ECU protection damper and rear fender.)
14. Rear Right Turn Signal Light Lead
15. Under the Seat (Viewed from bottom)
16. Regulator/Rectifier Leads
17. Regulator/Rectifier
18. Run the regulator/rectifier leads through the hole on the rear fender, and run them between the bracket and the rear fender.

Cable, Wire, and Hose Routing





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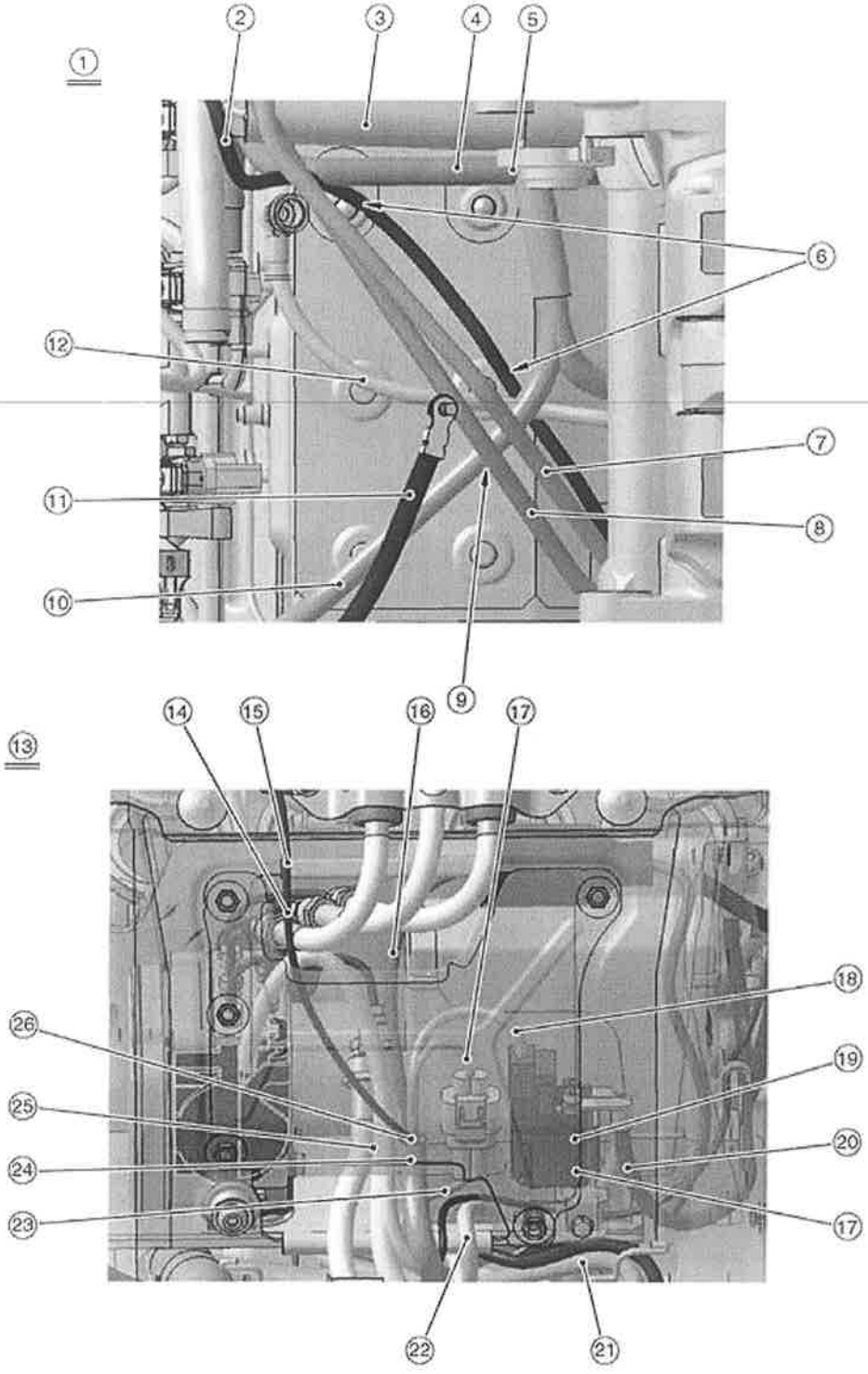
Cable, Wire, and Hose Routing

1. Surrounding of the Right Handlebar
2. Run the throttle cables between the front fork and the brake hose.
3. Throttle Cables
4. Right Switch Housing Lead
5. Run the throttle cables, right switch housing lead and right grip warmer lead into the guide.
6. Run the throttle cables over the right switch housing lead.
7. Seat Lock Cable Routing
8. Seat Lock Cable
9. Run the seat lock cable over the saddlebag holder.
10. Run the seat lock cable through the middle hole on the rear frame.

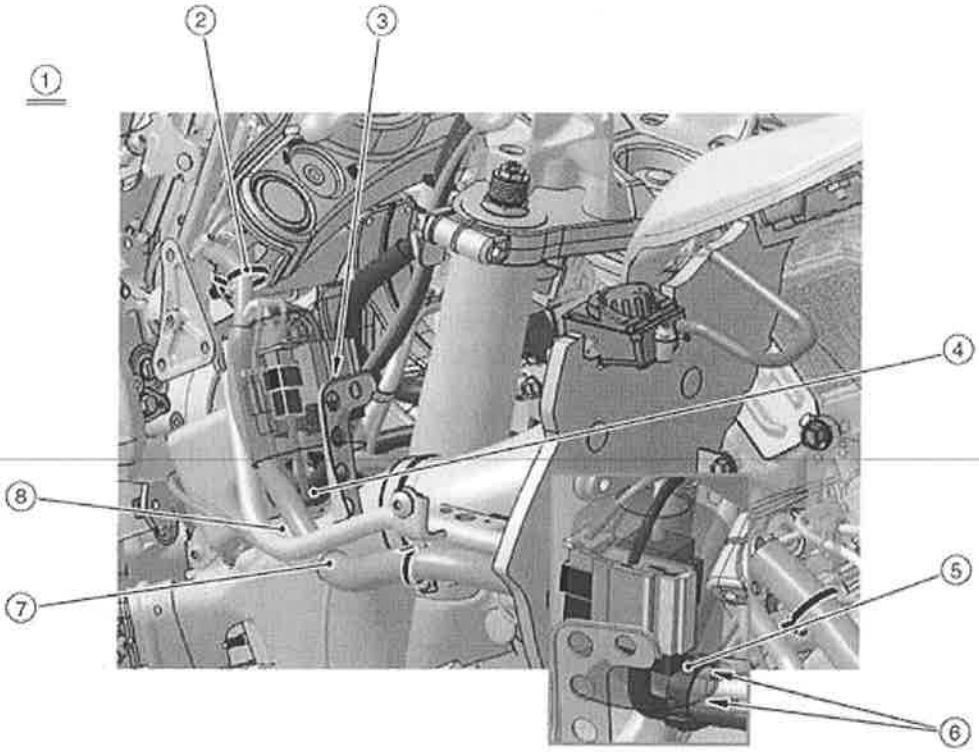
Cable, Wire, and Hose Routing

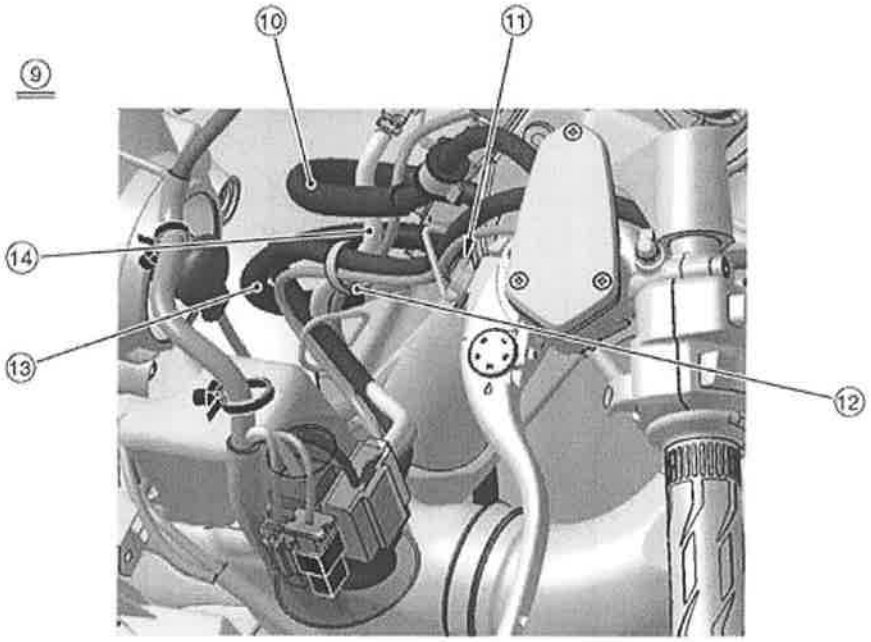


Cable, Wire, and Hose Routing

1. Under the Battery Case (Viewed from Bottom, Other than CAL, CN, SEA-B1 and TH Models)
2. Alternator Lead
3. Main Harness
4. Fuel Hose
5. Run the fuel hose over the main harness.
6. Run the alternator lead under the fuel hose, and run it over the fuel tank drain hose, breather hose, battery positive (+) cable and main harness.
7. Fuel Tank Drain Hose
8. Breather Hose
9. Run the main harness under the alternator lead and battery positive (+) cable, and run it over the fuel tank drain hose and breather hose.
10. Main Harness
11. Run the ground cable under the fuel tank drain hose, breather hose and main harness.
12. Run the battery positive (+) cable over the fuel tank drain hose, breather hose and main harness, and run it under the alternator lead.
13. Battery Case (Viewed from Rear)
14. Run the intake air temperature sensor lead through the upper hole of the cover.
15. Intake Air Temperature Sensor Lead
16. Battery Positive (+) Cable
17. Connect the main harness connector in the battery case.
18. Stater Relay Lead
19. Stater Relay
20. Run the battery positive (+) cable to the outside of the starter relay lead.
21. Do not pinch the starter motor cable with the cover.
22. Run the starter motor cable under the alternator lead, and run it over the main harness and fuel tank drain hose.
23. Run the battery negative (–) cable under the starter relay.
24. Run the K-ACT ABS hydraulic unit lead to the left side of the main harness.
25. Run the K-ACT ABS hydraulic unit lead under the fuel hose.
26. Run the main harness and K-ACT ABS hydraulic unit lead through the lower hole of the cover.

Cable, Wire, and Hose Routing





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Cable, Wire, and Hose Routing

1. Left Air Intake Duct
2. Insert the clamp on the main harness to the bracket.
3. After connecting the connectors for the steering lock unit lead, left switch housing lead and left grip warmer lead, place the water-proof cover in front of the fairing stay bracket after putting the connectors into the water-proof cover.
4. Clamp (Run the steering lock unit lead, left switch housing lead and left grip warmer lead to the inside of the main harness, and through the clamp (Tighten the clamp completely).)
5. Clamp (Fit the harness from the under side of the clamp. (Tighten the clamp completely).)
6. Position the white tapes on the main harness near the clamp.
7. Run the main harness and headlight lead to the inside of the fairing stay.
8. Run the outside temperature sensor lead and headlight lead to the inside of the fairing stay.
9. Left Side of the Head Pipe
10. Clutch Hose
11. Run the left switch housing lead and left grip warmer lead into the clamp on the front fork, and run them through the clamp from the front side.
12. Clamp (Tighten the clamp completely. Position the remainder strap end faces rearward.)
13. Brake Hose
14. Run the steering lock unit lead to the inside of the clutch hose, and to the upside of the brake hose, and run them through the clamp from the front side.

Cable, Wire, and Hose Routing

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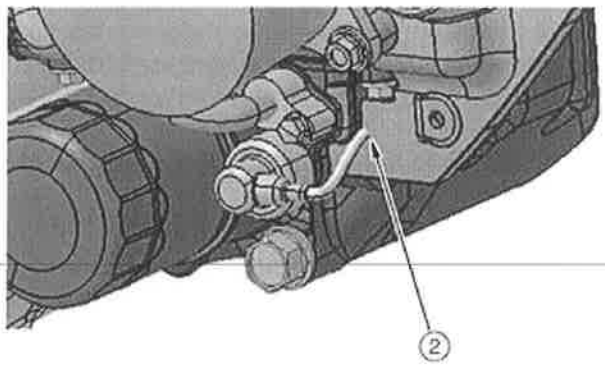

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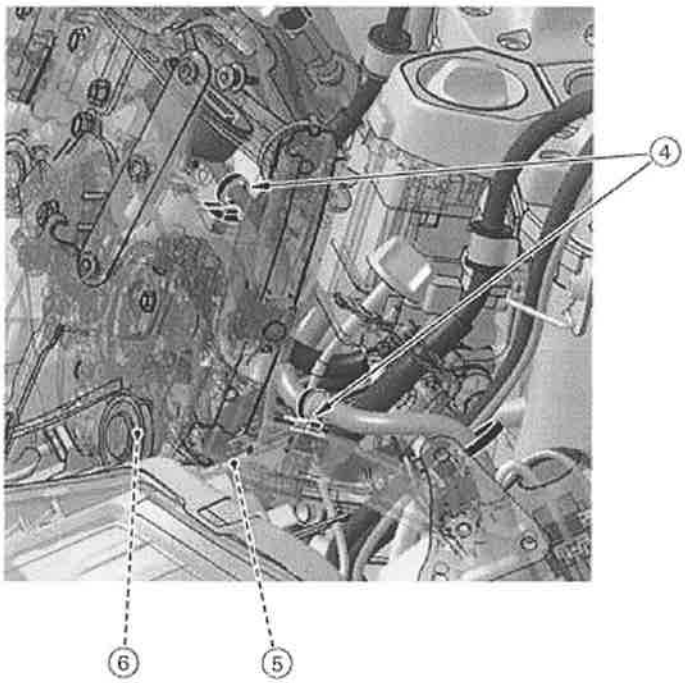
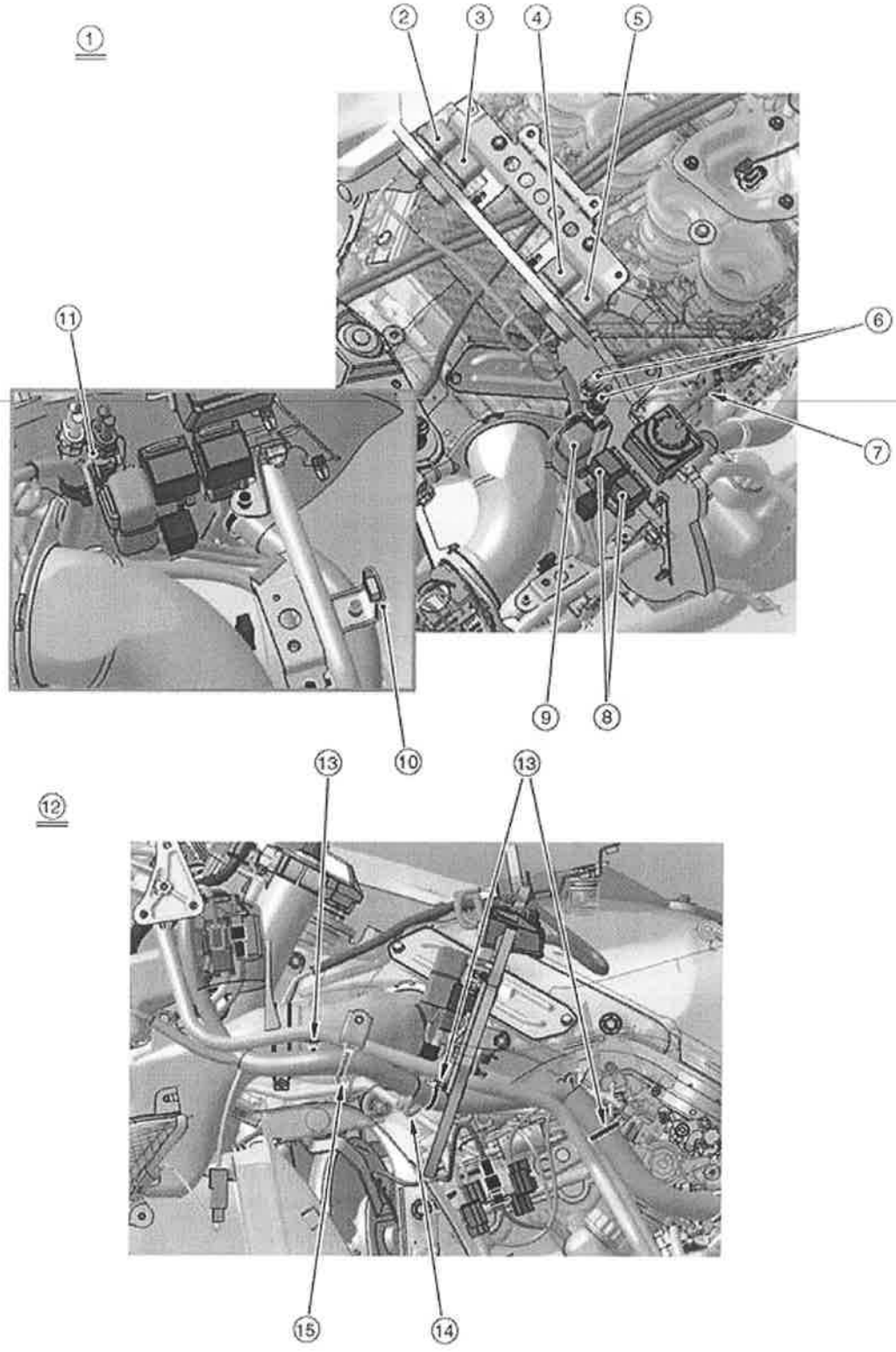


Cable, Wire, and Hose Routing

1. Oil Pressure Switch Lead
2. Run the oil pressure switch lead on the lower step of the left inner rubber cover.
3. Meter Left Side
4. Insert the clamp on the meter lead to the electric windshield assembly.
5. Run the electric windshield motor lead under the electric windshield assembly.
6. Electric Windshield Motor Lead Connector

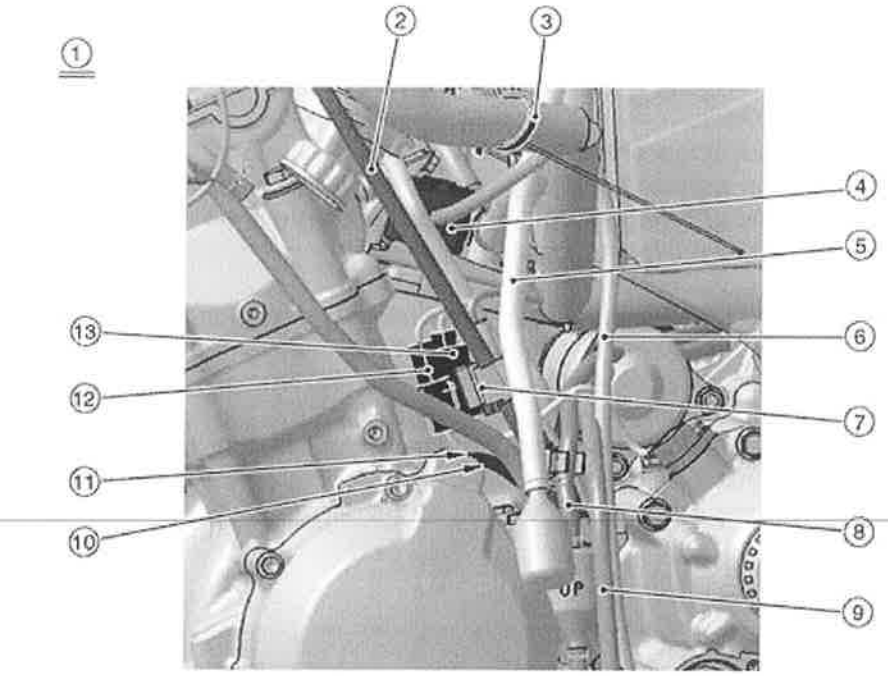
Cable, Wire, and Hose Routing

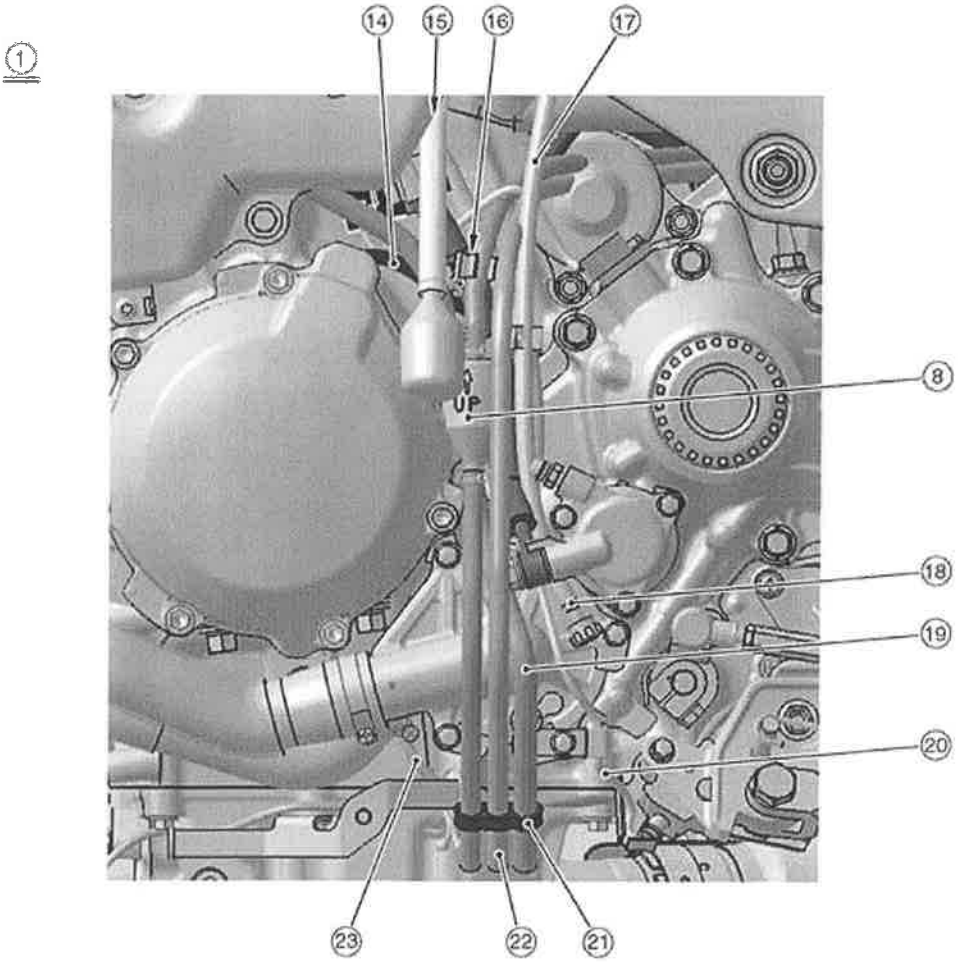


Cable, Wire, and Hose Routing

1. Front Left of the Fuel Tank
2. Accessory Relay
3. KIPASS Signal Relay
4. Headlight Relay (Hi)
5. Headlight Relay (Lo)
6. Grip Warmer Controller Connectors
7. Fit the surplus left grip warmer lead under the electric windshield relays and front side of the pad.(Do not appear the grip warmer controller connectors from the dust cover.)
8. Electric Windshield Relays (Up and Down)
9. Grip Warmer Relay
10. Hold the main harness with the clamp so that the clamp opening faces outside.
11. Hold the relay lead and grip warmer controller lead with the clamp.
12. Frame Left Side
13. Insert the clamps on the main harness to the left fairing stay.
14. Run the glove compartment solenoid lead, electric windshield relay leads and grip warmer controller lead under the main harness.
15. Clamps (Insert the clamp on the main harness to the fairing stay.)

Cable, Wire, and Hose Routing





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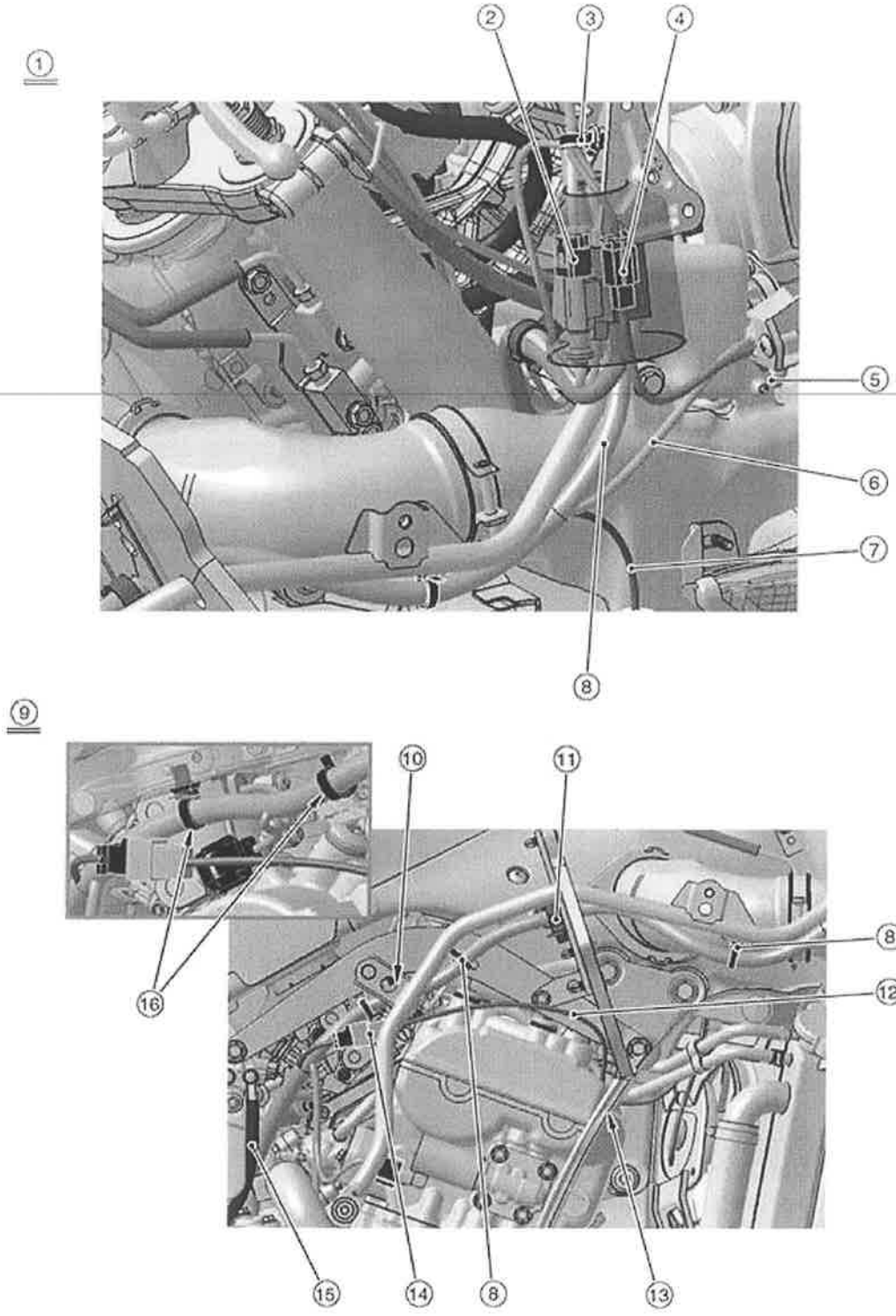
Cable, Wire, and Hose Routing

1. Engine Left Side
2. Clutch Hose
3. Clamp (Insert the clamp on the main harness to the bracket.)
4. Engine Subharness Connector (Insert the engine subharness connector to the bracket.)
5. Air Cleaner Drain Hose
6. Run the idle adjusting screw cable to the outside of the main harness.
7. Oil Pressure Switch/Gear Position Switch Lead Connector
8. Fuel Tank Breather Hose (Other than CAL, CN, SEA-B1 and TH Models)
9. Fuel Tank Drain Hose
10. Run the alternator lead to the most inside of the any harnesses and hoses.
11. Run the side stand switch lead and oil pressure switch/gear position switch lead most inside of the hoses.
12. Side Stand Switch Lead Connector
13. Speed Sensor Lead Connector
14. Alternator Lead
15. Run the air cleaner drain hose to the inside of the main harness.
16. Clamp (Hold the fuel tank breather hose and clutch hose.)
17. Idle Adjusting Screw Cable
18. Run the idle adjusting screw cable through the recess of the rubber cover.
19. Reserve Tank Overflow Hose
20. Side Stand Switch Lead
21. Clamp (Hold the fuel tank breather hose, fuel tank drain hose and reserve tank overflow hose.)
22. Fuel Tank Drain Hose
23. Gear Position Switch Lead

Cable, Wire, and Hose Routing

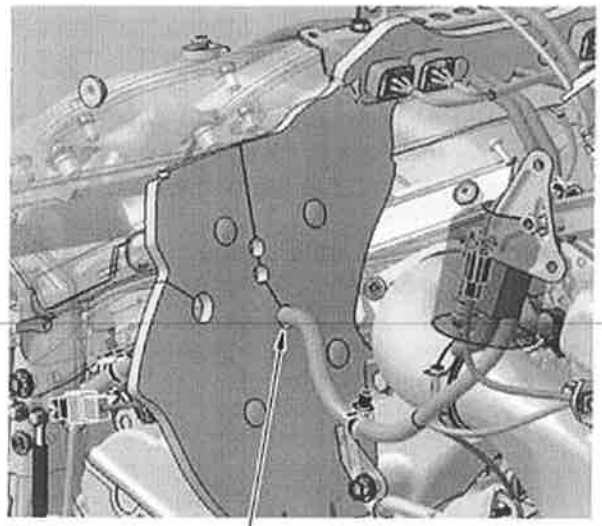


Cable, Wire, and Hose Routing

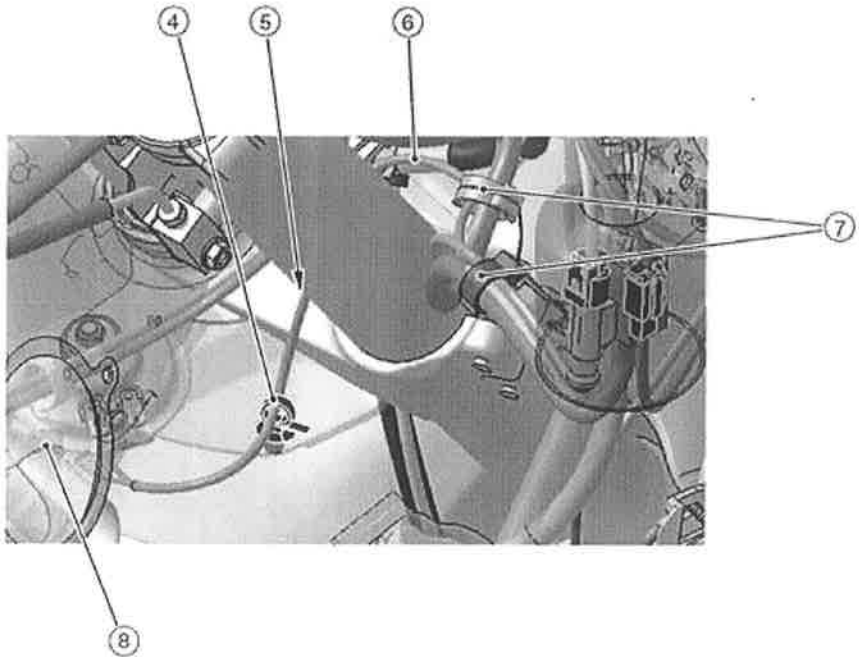
1. Right Intake Air Duct
2. After connecting the connectors of the front wheel rotation sensor, right switch housing, grip warmer and city light, put the connectors into the water-proof cover.
3. Insert the clamp on the main harness to the bracket.
4. City Light Lead Connector
5. Run the headlight lead and city light lead between the resonator and the headlight.
6. Headlight Lead
7. Right Turn Signal Light Lead
8. Run the main harness to the outside of the fairing stay.
9. Engine Right Side
10. Run the main harness to the inside of the fairing stay. When tighten the fairing stay bots, slide the main harness downward for the main harness does not pinch.
11. Insert the clamp on the main harness to the bracket.
12. Right Fan Motor Lead
13. Run the air bleeder hose for thermostat housing and right fan motor lead through the recess of the inner rubber cover.
14. Right Fan Motor Lead Connector
15. Run the main harness to the inside of the engine ground cable.
16. Insert the clamps on the main harness to the subframe.

Cable, Wire, and Hose Routing

①



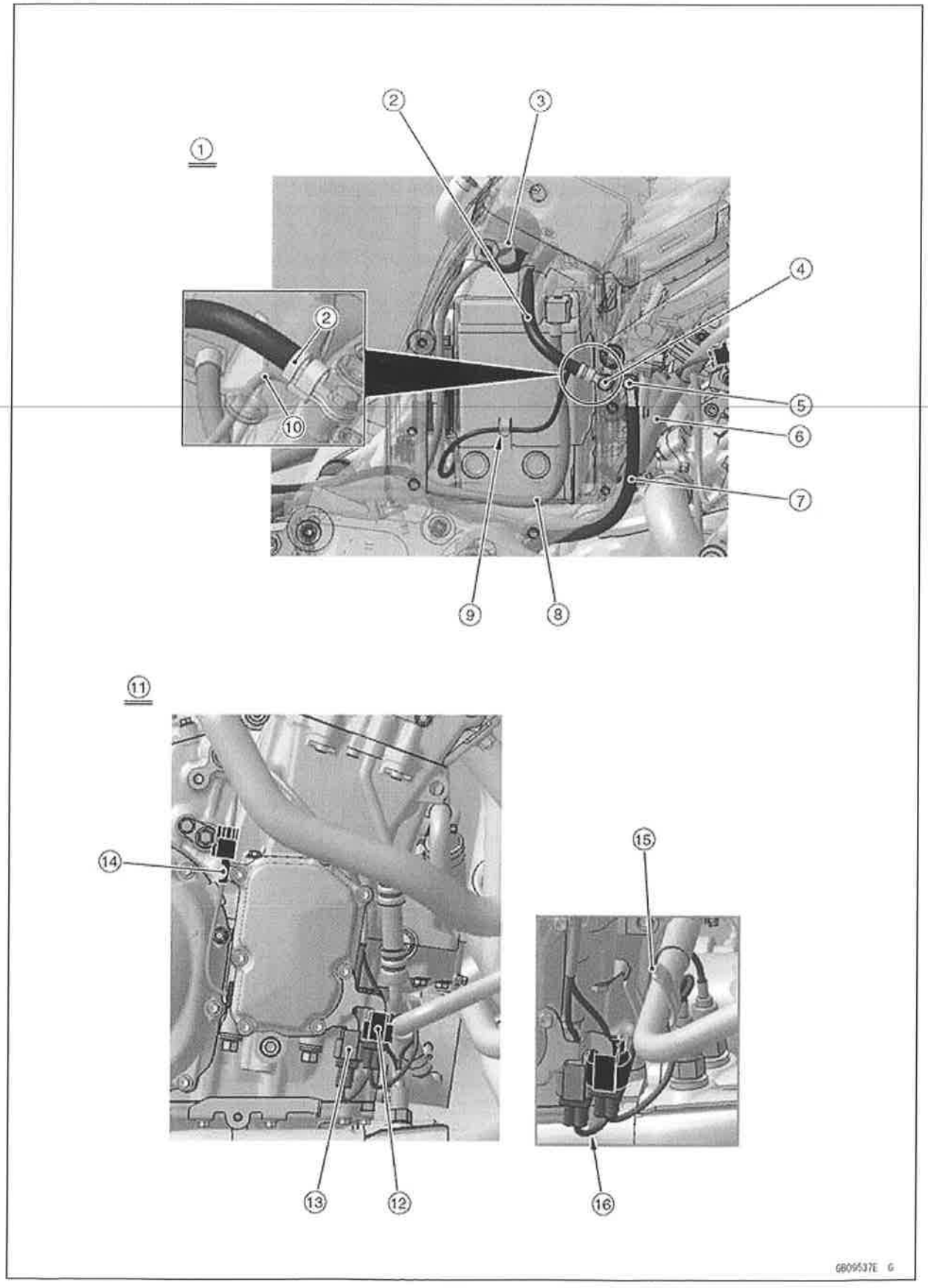
③



Cable, Wire, and Hose Routing

1. Front Right of the Fuel Tank
2. Run the main harness through the recess of the pad.
3. Horn Lead Routing
4. Insert the clamp on the horn lead to the heat insulation plate.
5. Run the horn lead to the inside of the front fork.
6. Horn Lead
7. Run the right switch housing lead, horn lead, right grip warmer lead and front wheel rotation sensor lead through the clamps (Tighten the clamp completely.).
8. Horn

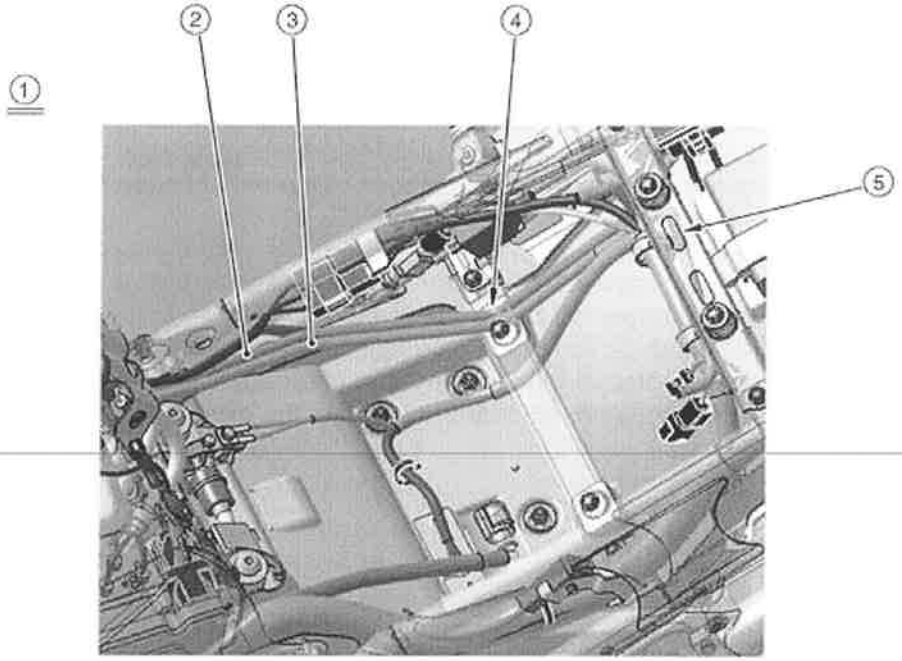
Cable, Wire, and Hose Routing

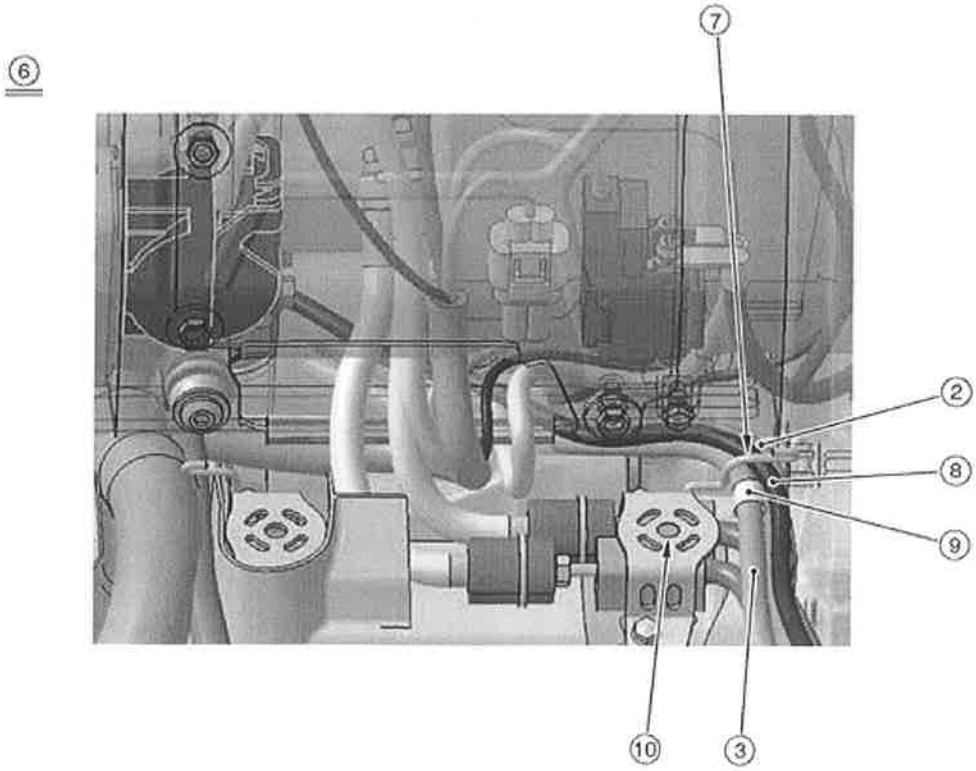


Cable, Wire, and Hose Routing

1. Inside of the Battery Box
2. Battery Negative (–) Cable
3. Connect the battery positive (+) cable and positive (+) lead.
4. Tighten the bolt together with the battery negative (–) lead and battery negative (–) cable.
5. Tighten the bolt together with the engine ground cable.
6. Main Harness
7. Run the engine ground cable to the outside of the main harness.
8. Battery Positive (+) Cable
9. Run the battery negative (–) lead through the hook of the battery case.
10. Battery Negative (–) Lead
11. Engine Lower Right Side
12. Insert the oxygen sensor heater #1 connector to the bracket.
13. Insert the oxygen sensor heater #2 connector to the bracket.
14. Clamp (Hold the crankshaft sensor lead connector.)
15. Run the oxygen sensor heater #1 lead under the radiator hose, and hold it with the clamp.
16. Position the oxygen sensor heater #1 connector so that the oxygen sensor heater #2 lead does not press.

Cable, Wire, and Hose Routing

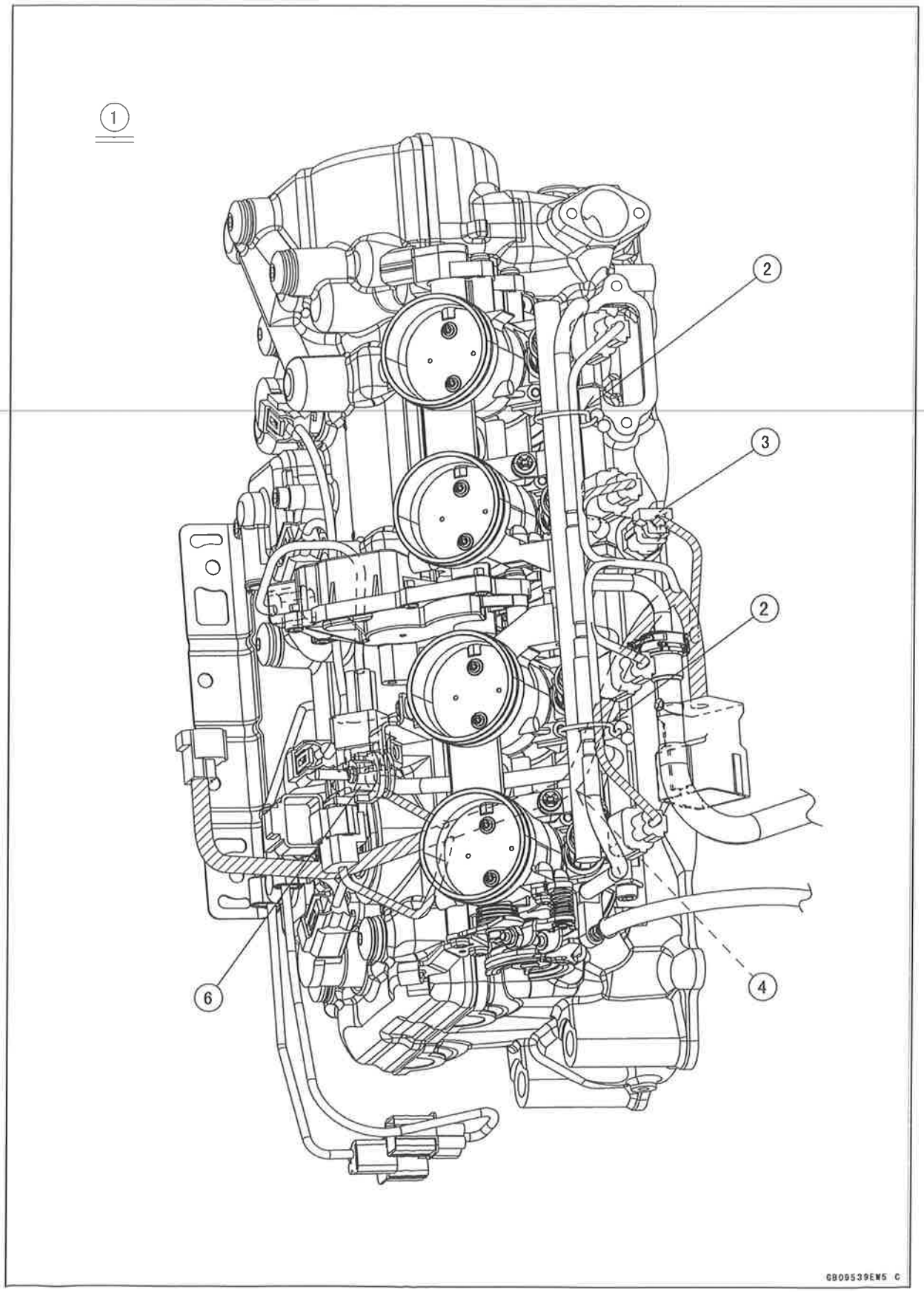




Cable, Wire, and Hose Routing

1. Under the Fuel Tank (Other than CAL, CN, SEA-B1 and TH Models)
2. Fuel Tank Breather Hose
3. Fuel Tank Drain Hose
4. Run the fuel tank breather hose and drain hose over the cross bracket.
5. Run the fuel tank drain hose to the backside of the clamp.
6. Under the Battery (Other than CAL, CN, SEA-B1 and TH Models)
7. Run the fuel tank breather hose, drain hose, and alternator lead under the guide.
8. Alternator Lead
9. Align the yellow tape on the fuel tank drain hose with the guide.
10. Do not position the any hose and harness on the bracket under the fuel tank.

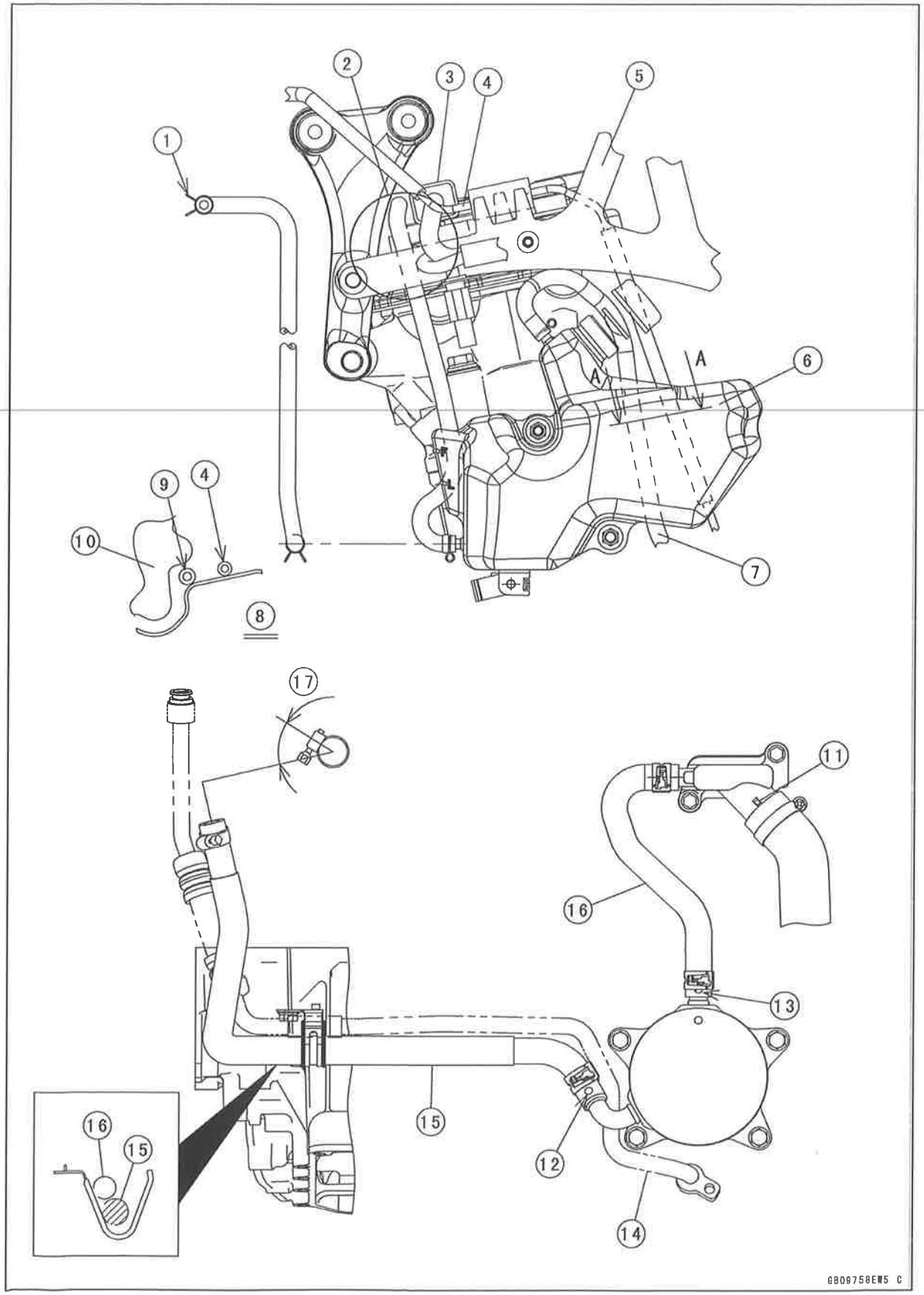
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Throttle Body Assy
2. Clamp (Hold the throttle body subharness and vacuum hose.)
3. Water Temperature Sensor Connector (Run the water temperature sensor lead through the hole of the heat insulation rubber plate.)
4. Run the throttle body subharness through the throttle body assy lower side.

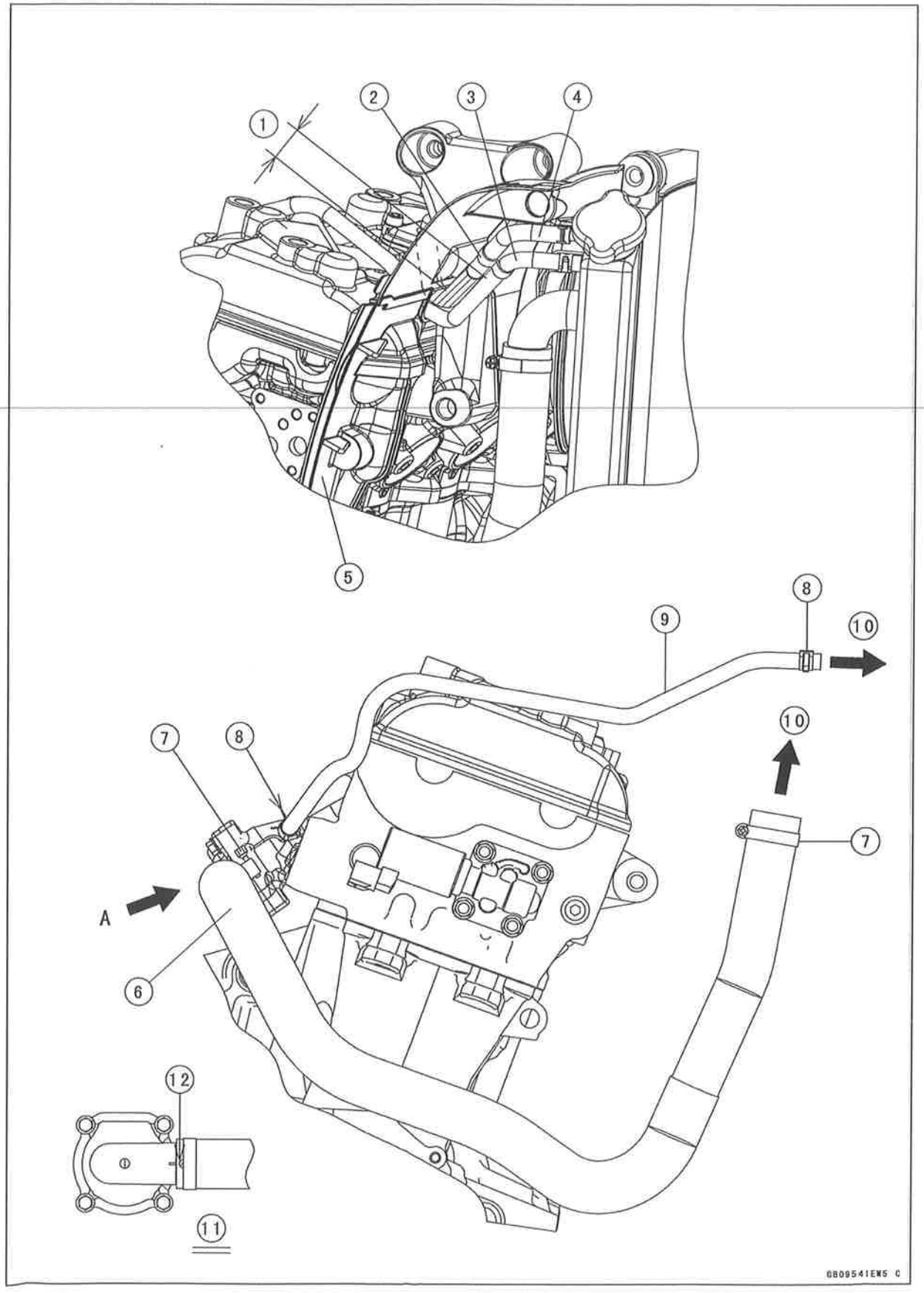
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Install the clamp so that the clamp knob faces right side of the frame as shown.
2. Run the radiator overflow hose between the subframe and engine and inside of the clutch pipe, and front of the engine subharness connector.
3. Engine Subharness Connector
4. Clutch Pipe
5. Subframe
6. Coolant Reserve Tank
7. Run the reserve tank overflow hose between the coolant reserve tank and engine.
8. Section A - A
9. Reserve Tank Overflow Hose
10. Engine (Crankcase)
11. Insert the hose until it hit the projection of the cylinder fitting.
12. Install the hose so that white painted mark on the hose faces the front side.
13. Install the hose so that red painted mark on the hose faces the front side.
14. Oil Pipe
15. Outlet Hose
16. Inlet Hose
17. About 45°

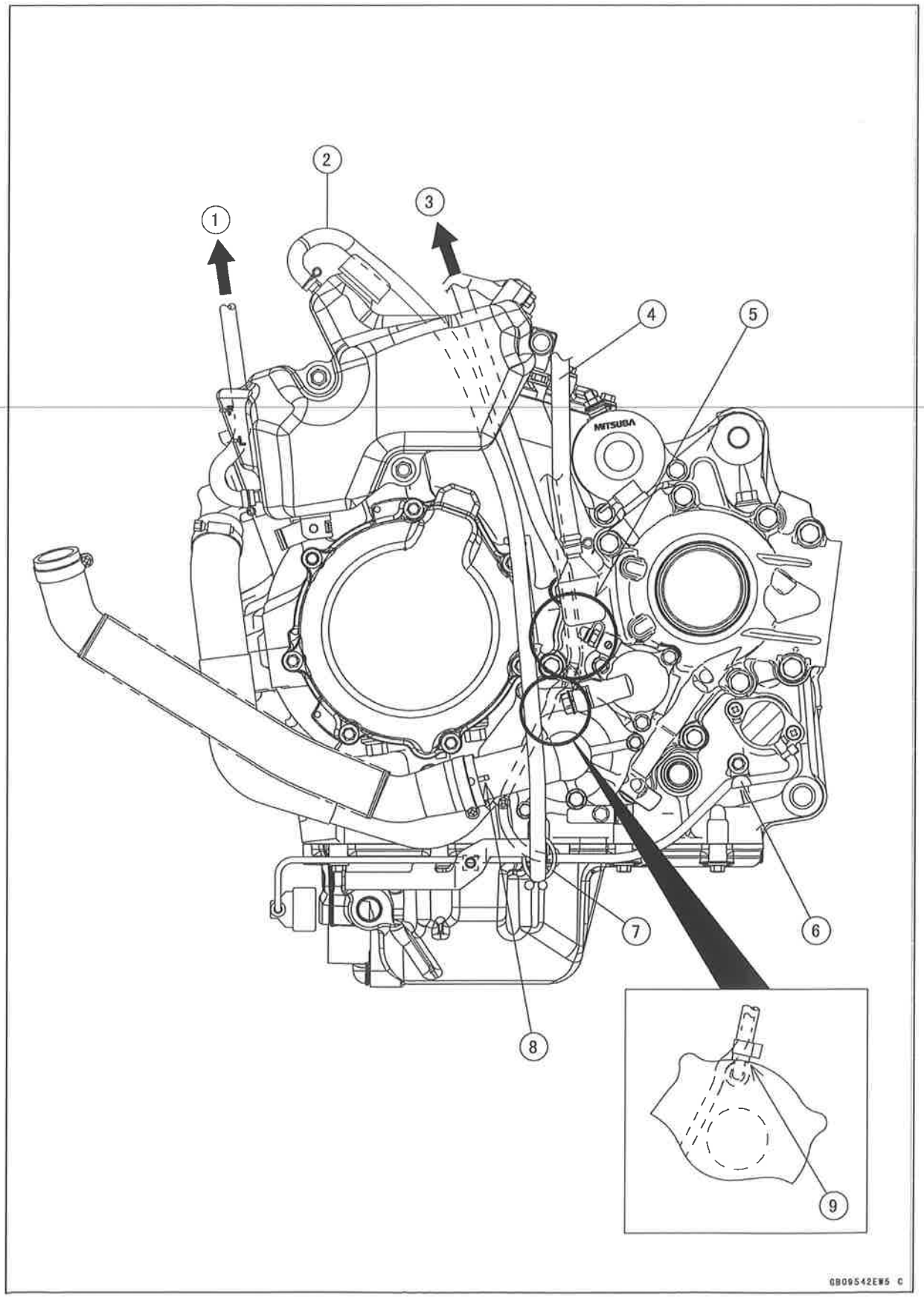
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. After setting the radiator overflow hose to the radiator, adjust the position of the hose protector so that the protector end comes 25 ~ 30 mm (0.98 ~ 1.18 in.) from the inner rubber cover.
2. Clamp (Hold the radiator overflow hose and air bleeder hose as shown.)
3. Air Breeder Hose for Thermostat Housing
4. Radiator Overflow Hose
5. Inner Rubber Cover
6. Water Hose
7. Clamp (The clamp screw faces as shown.)
8. Clamp (The clamp knob faces as shown.)
9. Air Bleeder Hose for Thermostat Housing
10. To Radiator
11. Viewed A
12. Align the red painted mark on the hose with the mark on the thermostat housing.

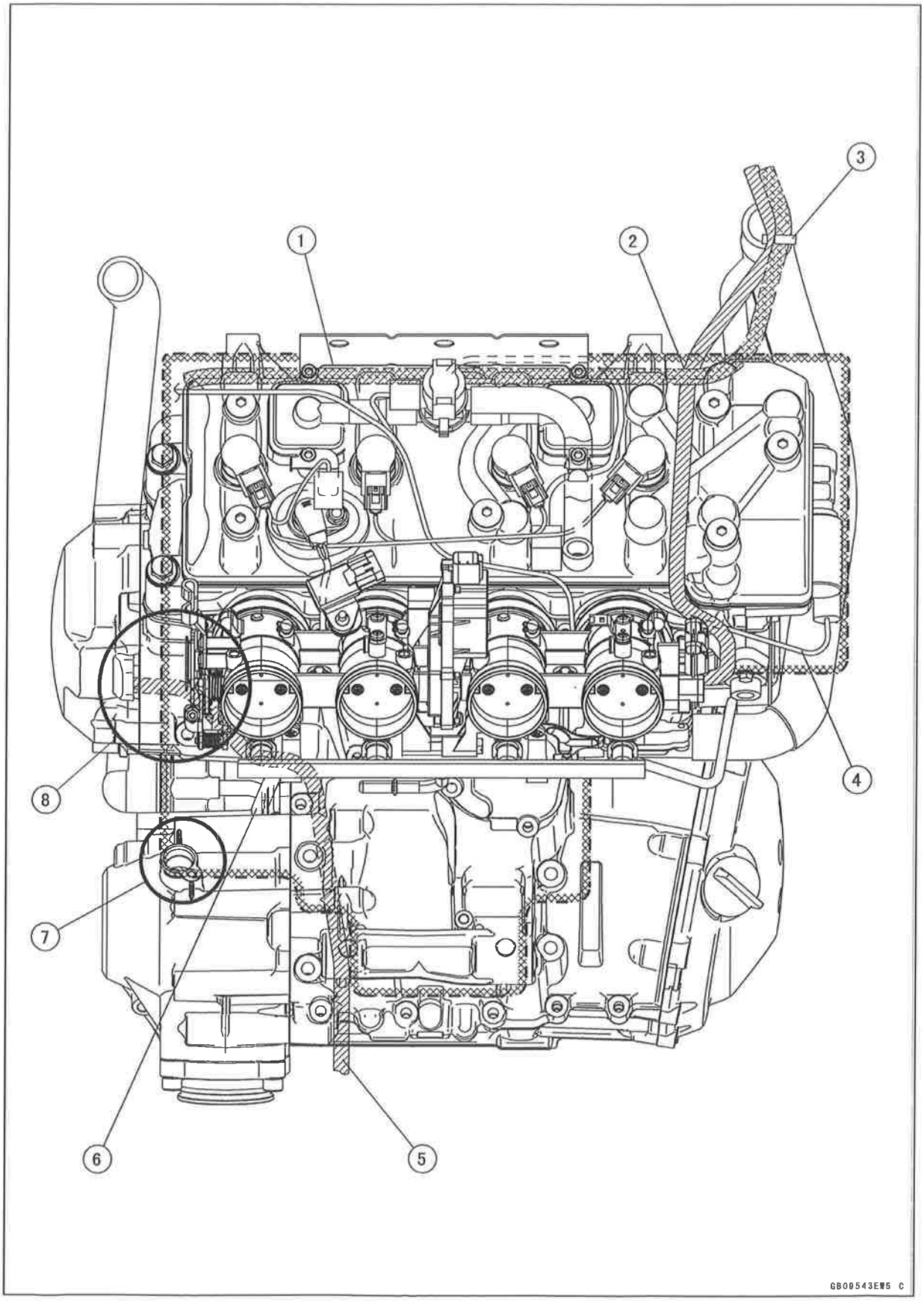
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. To Radiator
2. Reserve Tank Overflow Hose
3. To Thermostat Housing
4. Air Cleaner Drain Hose
5. Position the drain hose to the this side of the clutch hose.
6. Clamp (Hold the gear position switch lead.)
7. Clamp (Hold the oil pressure switch/gear position switch lead together with the bracket.)
8. Align the red painted mark on the hose with the mark on the water pump cover.
9. Run the oil pressure switch/gear position switch lead through the front side of the water pump air bleeder hose.

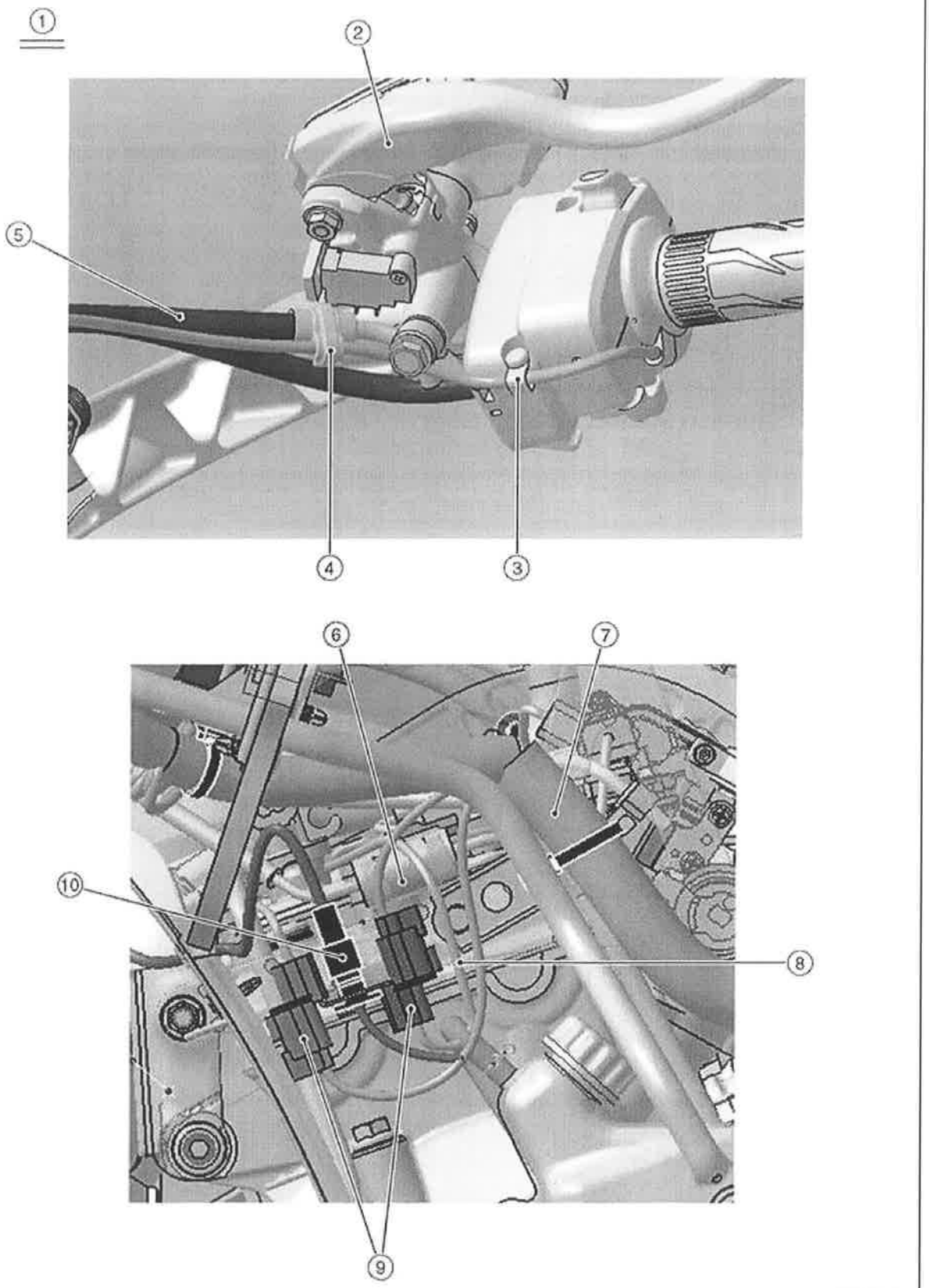
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Run the radiator overflow hose between the air suction valve and bracket.
2. Run the radiator overflow hose over the air bleeder hose of the thermostat housing.
3. Clamp (Hold the radiator overflow hose and air bleeder hose.)
4. Oil Control Solenoid Valve Lead
5. Connect the alternator lead to the regulator/rectifier through the subharness.
6. Hold the alternator lead with the clamp.
7. Connect the speed sensor lead to the main harness.
8. Run the alternator lead through the forward of the air bleeder hose come from the water pump.

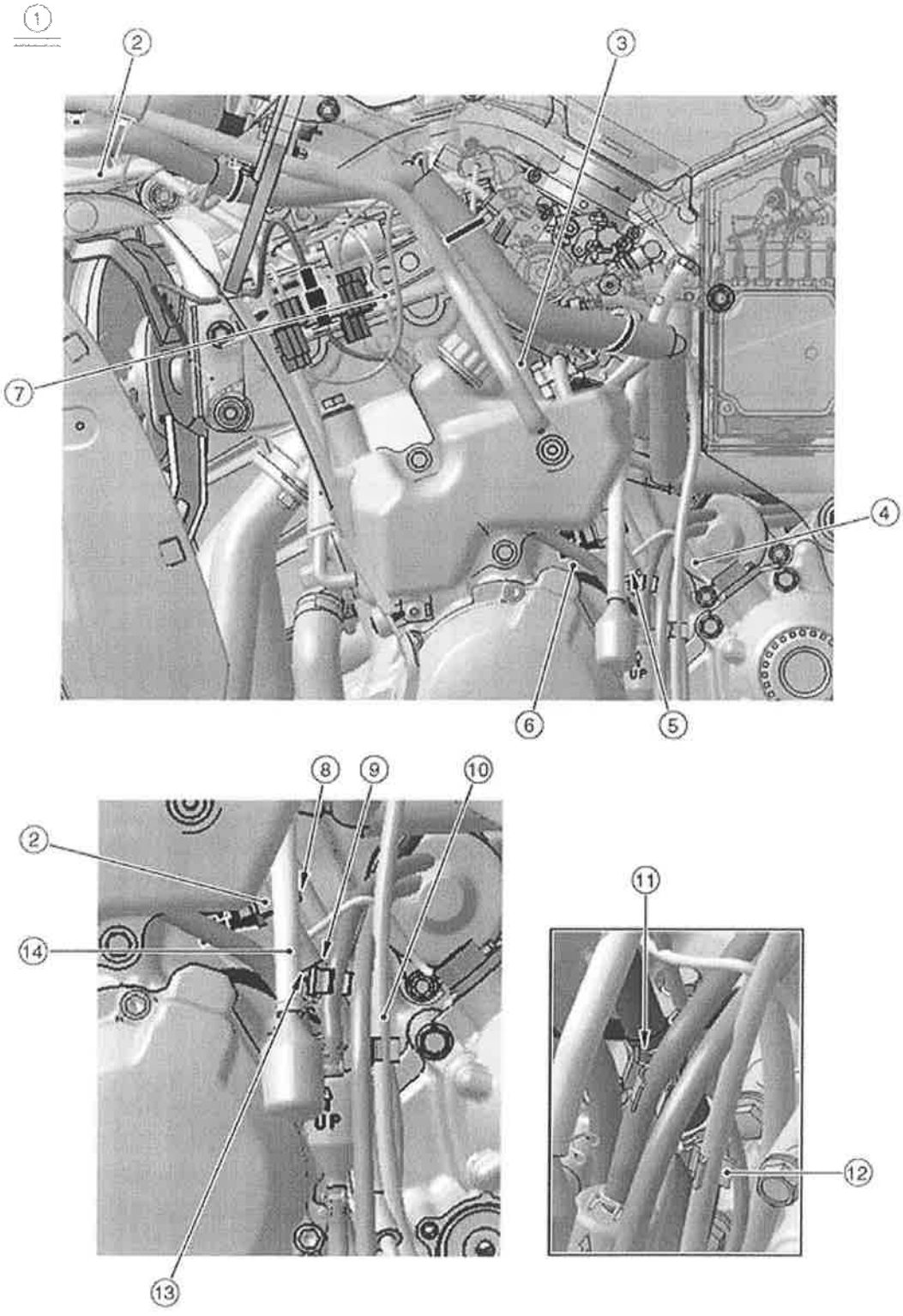
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Surrounding of Clutch Master Cylinder
2. Clutch Master Cylinder
3. Clamp (Align the clamp with the mark on the left grip warmer lead. Bend the clamp as shown.)
4. Clamp (Hold the left grip warmer lead and clutch hose as shown.)
5. Clutch Hose
6. Fix the clutch hose to the clamp of the subframe.
7. Run the clutch hose through the inside of the main harness and subframe.
8. Run the camshaft position sensor lead through the outside of the bracket.
9. Camshaft Position Sensor Lead Connectors
10. Left Radiator Fan Motor Connector

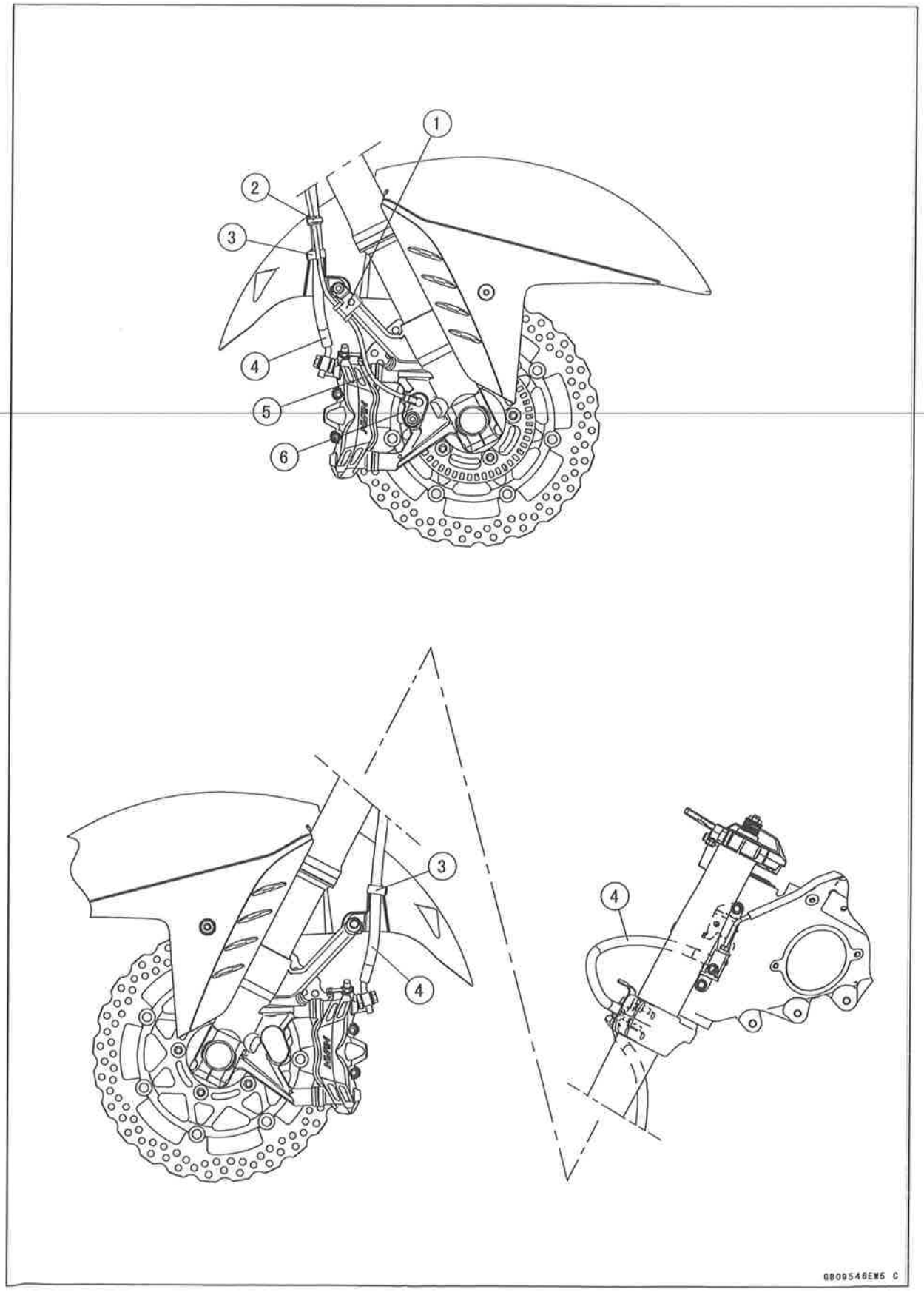
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Clutch Hose (Engine Left Side)
2. Clutch Hose
3. Run the clutch hose through the inside of the coolant reserve tank.
4. Speed Sensor Lead
5. Run the clutch hose through the outside of the side stand switch lead and speed sensor lead.
6. Side Stand Switch Lead
7. Run the camshaft position sensor lead through the outside of the bracket.
8. Run the clutch hose through the inside of the left subframe.
9. Run the clutch hose through the inside of the fuel tank breather hose.
10. Idle Adjusting Screw Cable
11. Clamp (Hold the fuel tank breather hose and clutch hose.)
12. Clamp (Hold the idle adjusting screw cable and clutch hose.)
13. Run the clutch hose through the inside of the air cleaner drain hose.
14. Air Cleaner Drain Hose

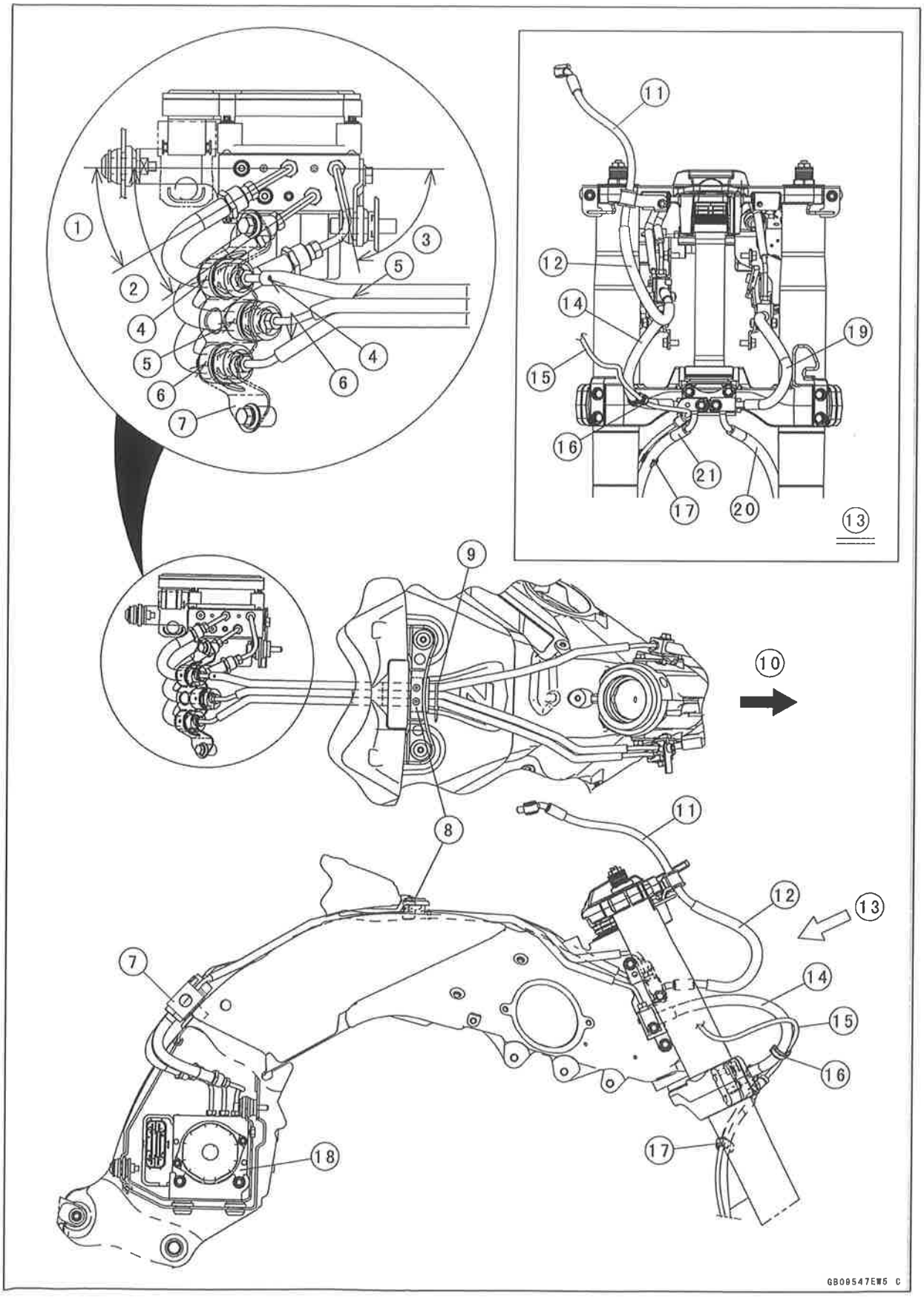
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Clamp (Hold the front wheel rotation sensor lead.)
2. Clamp (Hold the brake hose and front wheel rotation sensor lead, and align the clamp with white painted mark of the front wheel rotation sensor lead.)
3. Clamps (Hold the brake hose only and insert the clamp into the front fender. Face the lock portion of the clamp backward.)
4. Brake Hose
5. Front Wheel Rotation Sensor Lead
6. Front Wheel Rotation Sensor

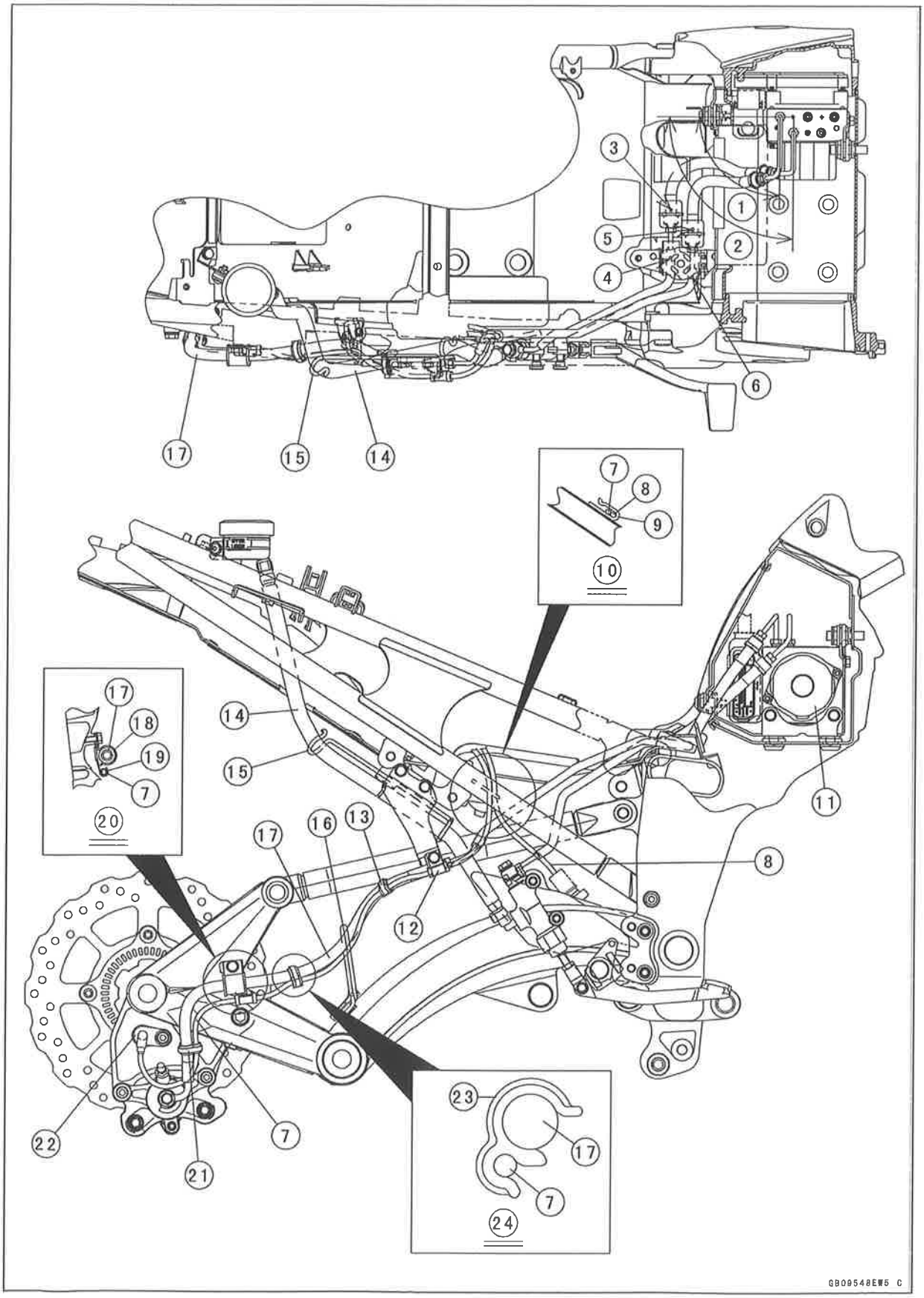
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. About 31°
2. About 35°
3. About 77°
4. Brake Pipe (Yellow Painted Mark)
5. Brake Pipe (White Painted Mark)
6. Brake Pipe (Blue Painted Mark)
7. Clamp
8. Damper
9. Band
10. Front
11. Brake Hose
12. Brake Hose
13. Front View
14. Brake Hose
15. Front Wheel Rotation Sensor Lead
16. Clamp (Hold the brake hose and front wheel rotation sensor lead, and align the clamp with white painted mark of the front wheel rotation sensor lead. Run the front wheel rotation sensor lead outside of the brake hose.)
17. Clamp (Hold the brake hose and front wheel rotation sensor lead, and align the clamp with white painted mark of the front wheel rotation sensor lead.)
18. K-ACT ABS Hydraulic Unit
19. Brake Hose
20. Brake Hose
21. Clamp (Hold the front wheel rotation sensor lead.)

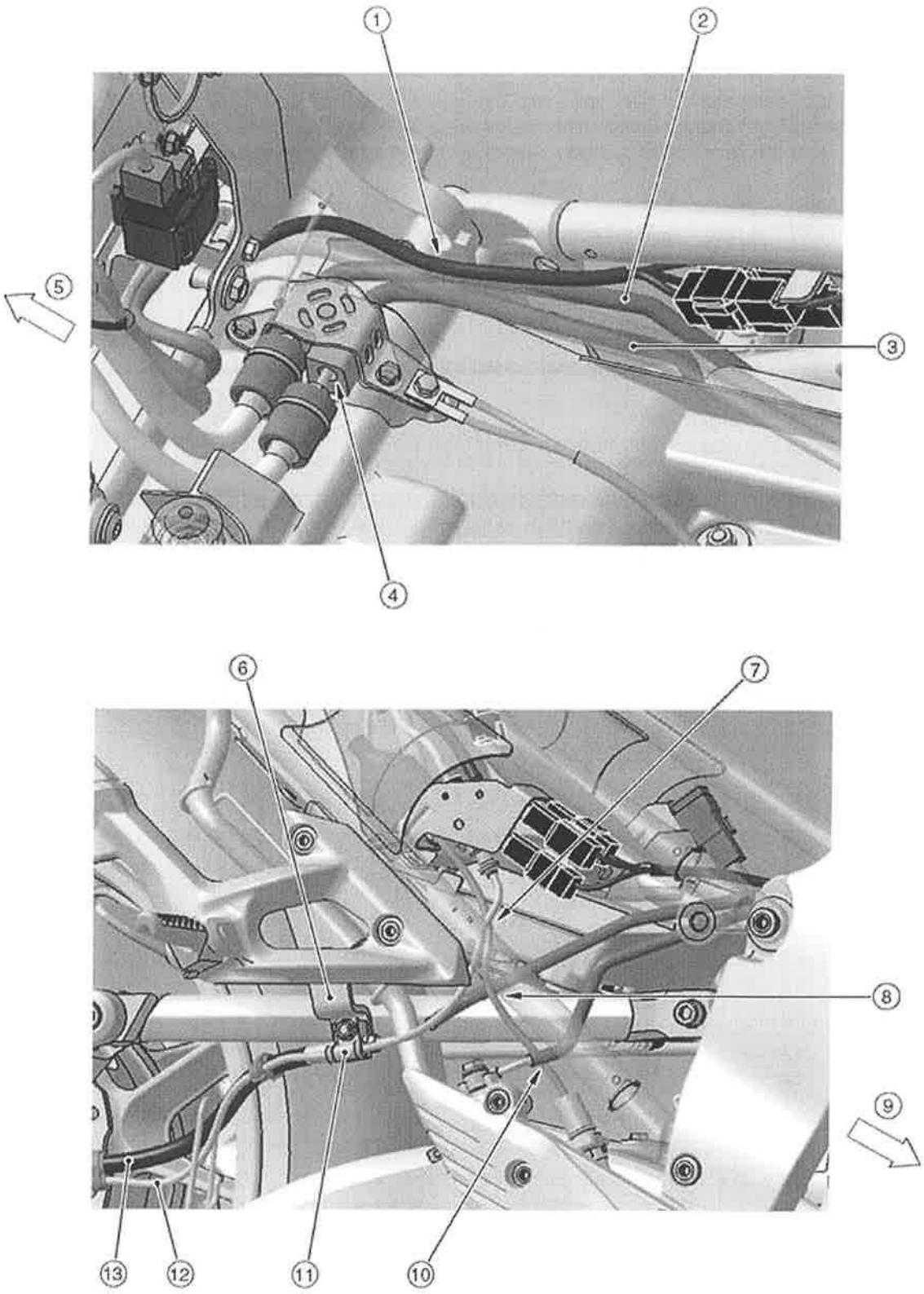
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. About 90°
2. About 90°
3. Brake Hose (Green Painted Mark)
4. Brake Pipe (Green Painted Mark)
5. Brake Hose (Purple Painted Mark)
6. Brake Pipe (Purple Painted Mark)
7. Rear Wheel Rotation Sensor
8. Rear Brake Right Switch Lead
9. Clamp (Hold the rear wheel rotation sensor lead and rear brake light switch lead.)
10. Upper View
11. K-ACT ABS Hydraulic Unit
12. Clamp (Hold the rear wheel rotation sensor lead.)
13. Clamp (Hold the brake hose and rear wheel rotation sensor lead, and align the clamp with white painted mark of the rear wheel rotation sensor lead. Install the clamp from upside.)
14. Brake Hose
15. Clamp (Hold the brake hose.)
16. Clamp (Hold the brake hose and rear wheel rotation sensor lead.)
17. Brake Hose
18. Clamp (Hold the brake hose.)
19. Clamp (Hold the rear wheel rotation sensor lead.)
20. Rear View
21. Clamp (Hold the brake hose and rear wheel rotation sensor lead, and align the clamp with white painted mark of the rear wheel rotation sensor lead. Install the clamp from outside.)
22. Rear Wheel Rotation Sensor
23. Clamp (Hold the brake hose and rear wheel rotation sensor lead, and align the clamp with white painted mark of the rear wheel rotation sensor lead. Install the clamp from outside.)
24. Front View

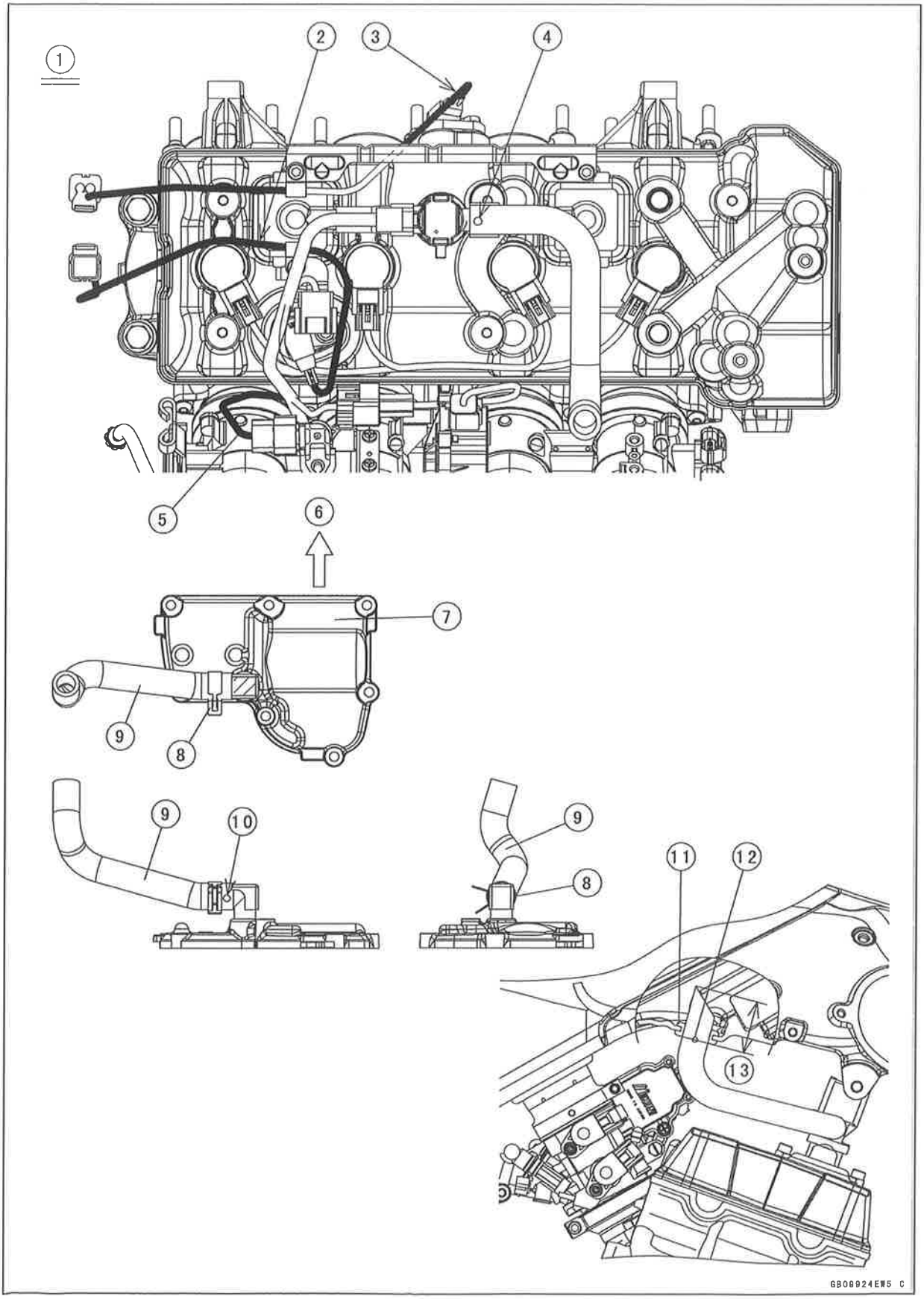
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Run the brake pipes under the hoses and leads.
2. Brake Pipe (Purple Painted Mark)
3. Brake Pipe (Green Painted Mark)
4. Insert the brake pipes to the holes of damper, and fit the projection on the damper into the hole of the bracket.
5. Front
6. Bracket (Install the bracket to the rear frame.)
7. Run the leads and brake pipe between the rear frame and torque rod.
8. Run the rear brake light switch lead to the outside of the brake pipe.
9. Front
10. Run the rear brake light switch lead to the inside of the brake pipe.
11. Clamp (Hold the rear wheel rotation sensor lead.)
12. Rear Wheel Rotation Sensor Lead
13. Brake Hose

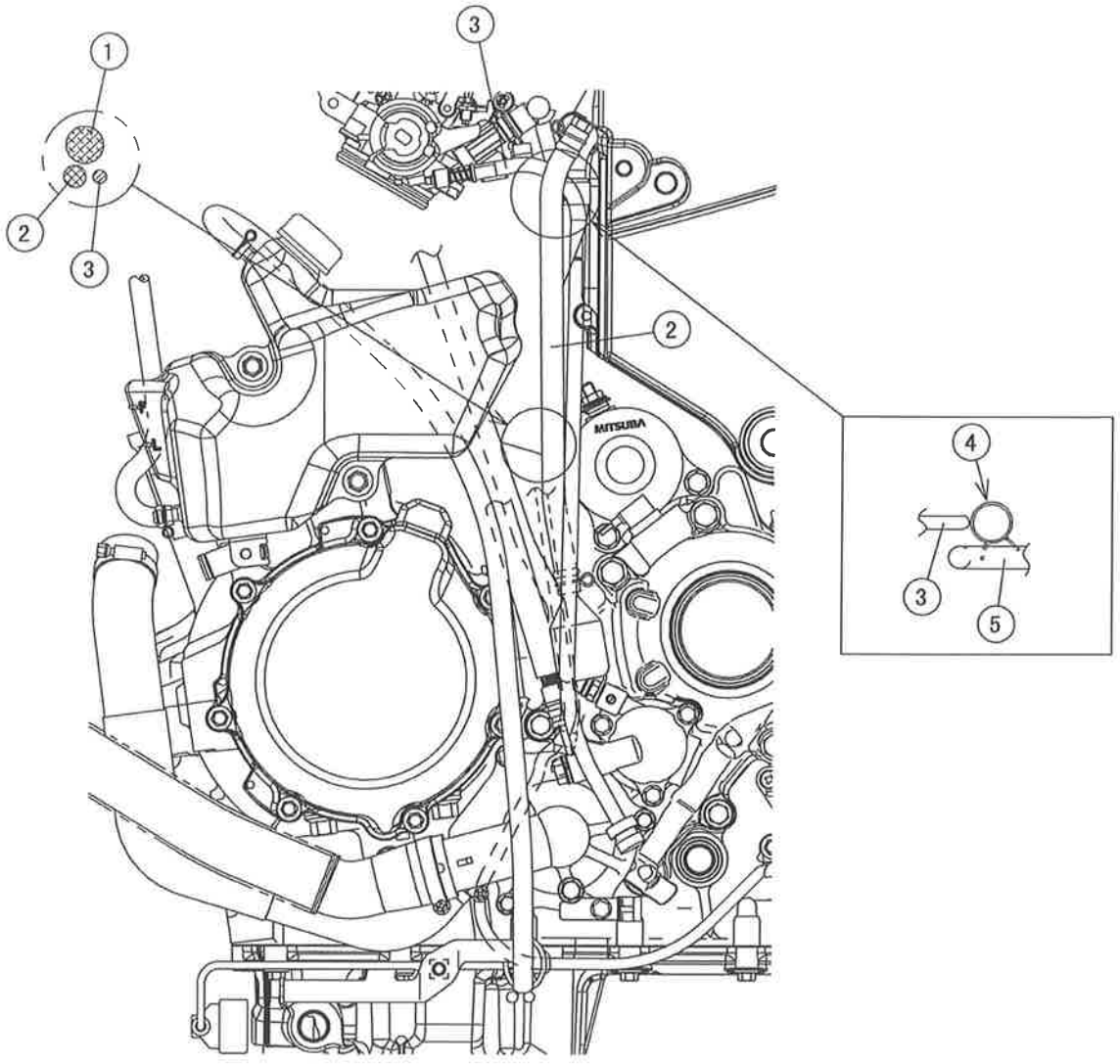
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. This figure omits a heat insulation rubber plate. Therefore run actually each lead on the heat insulation rubber plate.
2. Intake Camshaft Position Sensor Lead (Run the intake camshaft position sensor lead on the heat insulation rubber plate.)
3. Exhaust Camshaft Position Sensor Lead (Run the exhaust camshaft position sensor lead into the opening of the bracket. Next run it in the hole of the heat insulation rubber plate, and clamp it.)
4. White Mark
5. Throttle Body Subharness
6. Front
7. Breather Cover
8. Clamp
9. Breather Hose
10. Align the white mark with the plate end.
11. Grommet
12. Insert the breather hose until the half of the white mark is hidden.
13. About 41 mm (1.6 in.)

Cable, Wire, and Hose Routing



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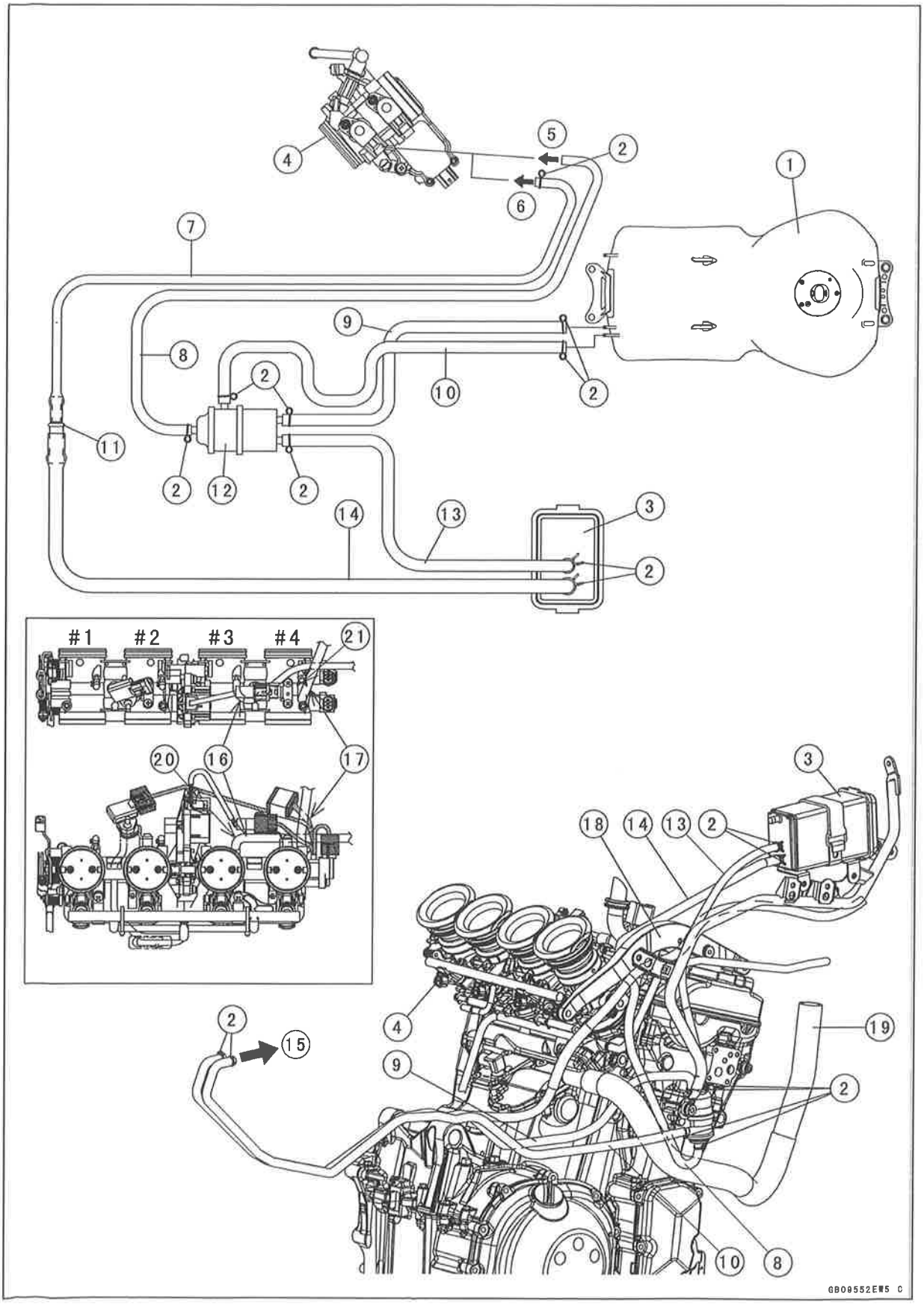
Cable, Wire, and Hose Routing

1. Main Harness
2. Air Cleaner Drain Hose (Run the air cleaner drain hose inside the main harness.)
3. Idle Adjusting Screw Cable
4. Clamp (Clamp is not contact the air cleaner drain hose and frame.)
5. Air Cleaner Drain Hose (Run the air cleaner drain hose through the front of the clamp.)

Cable, Wire, and Hose Routing

CAL, CN, SEA-B1 and TH Models

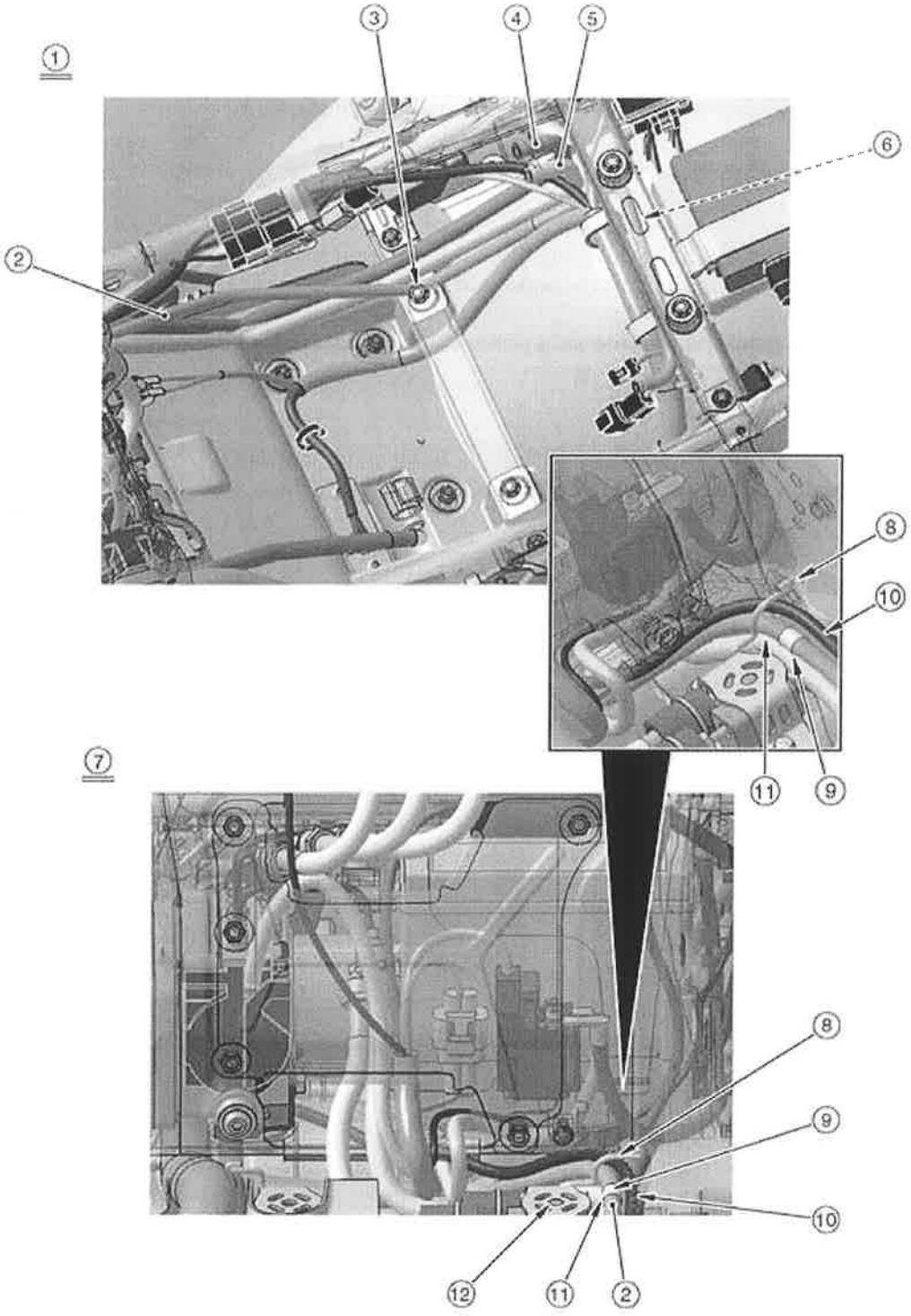


Cable, Wire, and Hose Routing

1. Fuel Tank
2. Clamps
3. Canister
4. Throttle Body Assy
5. To the fitting of the throttle body #3.
6. To the fitting of the throttle body #4.
7. Hose (Green)
8. Hose (White, Align the hose with radiator hose as shown, and run that hose under the main harness and subframe, and then connect the throttle body #3.)
9. Hose (Blue)
10. Hose (Red)
11. Fitting
12. Separator
13. Hose (Blue) (Run the hose between the subframe and fairing stay.)
14. Hose (Green) (Run the hose between the frame and subframe.)
15. To Fuel Tank
16. Run the hose (white) under the subthrottle valve actuator lead connector.
17. Run the hose (green) over the leads.
18. Subframe
19. Water Hose
20. Do not close the hose (white) by pulling the hose when installing.
21. Face the knob of the clamp to the front side.

Cable, Wire, and Hose Routing

CAL, CN, SEA-B1 and TH Models

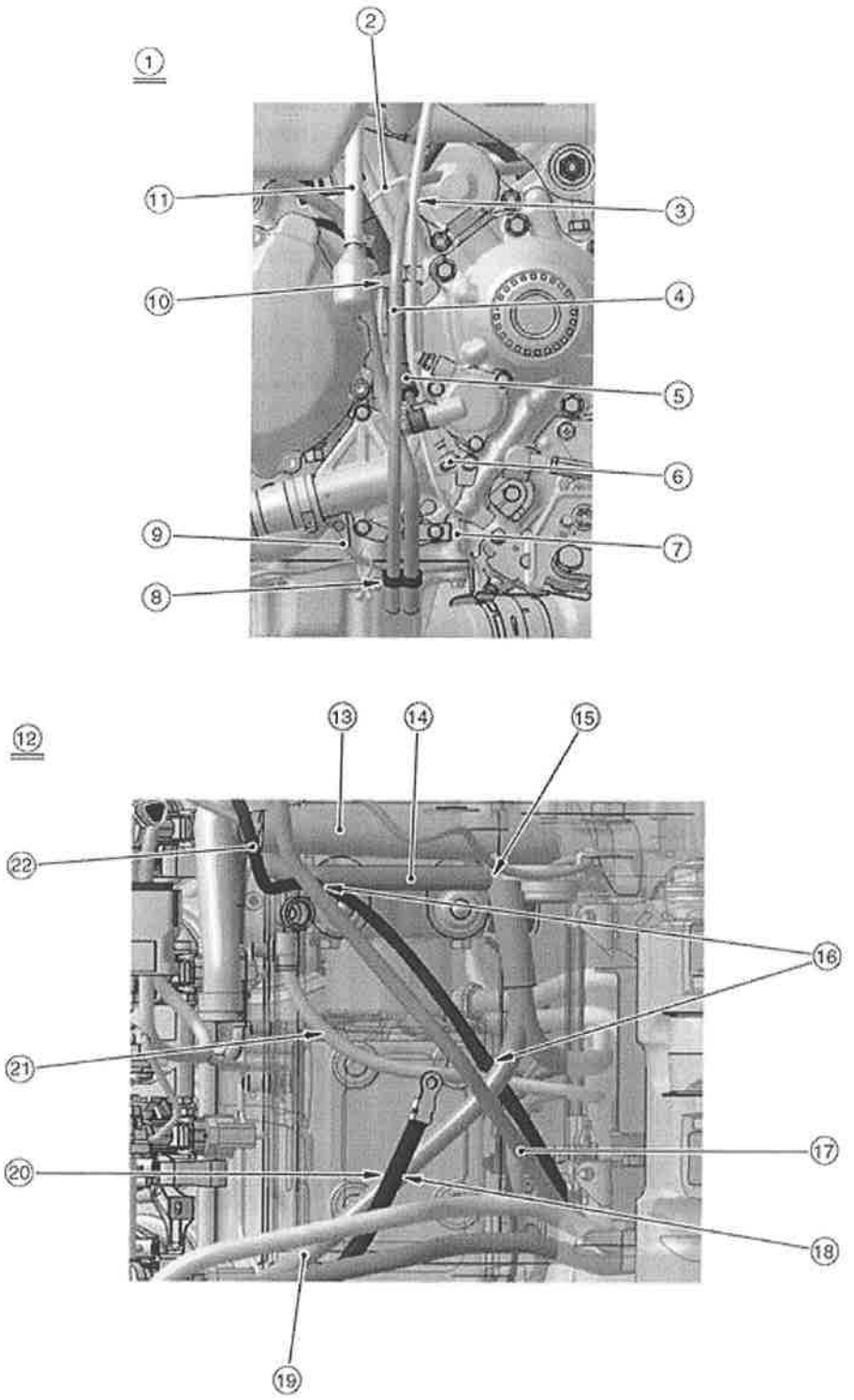


Cable, Wire, and Hose Routing

1. Under the Fuel Tank
2. Fuel Tank Drain Hose
3. Run the fuel tank drain hose and evaporative hoses to the upside of the cross bracket.
4. Evaporative Hose (Red)
5. Evaporative Hose (Blue)
6. Run the fuel tank drain hose to the backside of the clamp.
7. Under the Battery
8. Run the fuel tank drain hose, evaporative hoses, and alternator lead under the clamp.
9. Align the yellow tape on the fuel tank drain hose with the clamp.
10. Run the alternator lead to the right side of the fuel tank drain hose, and to the upside of the evaporative hoses.
11. Evaporative Hoses (Red and Blue)
12. Do not put the hose, lead, and harness on the bracket under the fuel tank.
13. Alternator Lead

Cable, Wire, and Hose Routing

CAL, CN, SEA-B1 and TH Models



Cable, Wire, and Hose Routing

1. Engine Left Side
2. Speed Sensor Lead
3. Idle Adjusting Screw Cable (Run the idle adjusting screw cable through the outside of the main harness.)
4. Fuel Tank Drain Hose
5. Clutch Hose
6. Idle Adjusting Screw
7. Side Stand Switch Lead
8. Clamp (Hold the fuel tank drain hose and reserve tank overflow hose.)
9. Gear Position Switch Lead
10. Clamp (Hold the reserve tank overflow hose and clutch hose.)
11. Air Cleaner Drain Hose
12. Under the Battery Case (Viewed from Bottom)
13. Main Harness
14. Fuel Hose
15. Run the fuel hose over the main harness.
16. Run the alternator lead under the fuel hose, and run it over the fuel tank drain hose, breather hose, battery positive (+) cable and main harness.
17. Fuel Tank Drain Hose
18. Run the main harness under the K-ACT ABS hydraulic unit leads, alternator lead and battery positive (+) cable, and run it over the fuel tank drain hose and evaporative hoses.
19. Main Harness (Right Side)
20. Run the engine ground cable under the fuel tank drain hose and main harness, and run it over the evaporative hoses.
21. Run the starter motor cable under the alternator lead, and run it over the main harness and fuel tank drain hose.
22. Alternator Lead

Cable, Wire, and Hose Routing

1. Engine Left Side
2. Speed Sensor Lead
3. Idle Adjusting Screw Cable (Run the idle adjusting screw cable through the outside of the main harness.)
4. Fuel Tank Drain Hose
5. Clutch Hose
6. Idle Adjusting Screw
7. Side Stand Switch Lead
8. Clamp (Hold the fuel tank drain hose and reserve tank overflow hose.)
9. Gear Position Switch Lead
10. Clamp (Hold the reserve tank overflow hose and clutch hose.)
11. Air Cleaner Drain Hose
12. Under the Battery Case (Viewed from Bottom)
13. Main Harness
14. Fuel Hose
15. Run the fuel hose over the main harness.
16. Run the alternator lead under the fuel hose, and run it over the fuel tank drain hose, breather hose, battery positive (+) cable and main harness.
17. Fuel Tank Drain Hose
18. Run the main harness under the K-ACT ABS hydraulic unit leads, alternator lead and battery positive (+) cable, and run it over the fuel tank drain hose and evaporative hoses.
19. Main Harness (Right Side)
20. Run the engine ground cable under the fuel tank drain hose and main harness, and run it over the evaporative hoses.
21. Run the starter motor cable under the alternator lead, and run it over the main harness and fuel tank drain hose.
22. Alternator Lead

Troubleshooting Guide

NOTE

○*Refer to the Fuel System chapter for most of DFI trouble shooting guide.*

○*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:
- Key knob and engine stop switch not ON
- Starter lockout switch or gear position switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relay not contacting or operating
- Starter button not contacting
- Starter system wiring open or shorted
- Steering lock unit trouble
- Engine stop switch trouble
- Main 30 A or ignition fuse blown

Starter motor rotating but engine doesn't turn over:
- Vehicle-down sensor (DFI) coming off
- Starter clutch trouble
- Starter idle gear trouble

Engine won't turn over:
- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter idle gear seizure
- Balancer bearing seizure

No fuel flow:
- No fuel in tank
- Fuel pump trouble
- Fuel tank air vent obstructed
- Fuel filter clogged
- Fuel line clogged

No spark; spark weak:
- Vehicle-down sensor (DFI) coming off
- Key knob not ON
- Engine stop switch turned OFF
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Spark plug dirty, broken, or gap maladjusted
- Spark plug incorrect
- Stick coil shorted or not in good contact
- Stick coil trouble
- ECU trouble
- Camshaft position sensor trouble
- Gear position, starter lockout, or side stand switch trouble
- Crankshaft sensor trouble
- Steering lock unit or engine stop switch shorted
- Starter system wiring shorted or open
- Main 30 A or ignition fuse blown

Fuel/air mixture incorrect:
- Bypass screw and/or idle adjusting screw maladjusted
- Air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Leak from oil filler cap, crankcase breather hose or air cleaner drain hose

Compression Low:
- Spark plug loose
- Cylinder head not sufficiently tightened down
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- No valve clearance
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed:

Spark weak:
- Battery voltage low
- Stick coil trouble
- Stick coil shorted or not in good contact
- Spark plug dirty, broken, or maladjusted
- Spark plug incorrect
- ECU trouble
- Camshaft position sensor trouble
- Crankshaft sensor trouble

Fuel/air mixture incorrect:
- Bypass screw maladjusted
- Air passage clogged
- Air bleed pipe bleed holes clogged
- Pilot passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Fuel tank air vent obstructed
- Fuel pump trouble
- Throttle body assy holder loose
- Air duct holder loose

Compression low:
- Spark plug loose

Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
Camshaft cam worm

Run-on (dieseling):
Steering lock unit trouble
Engine stop switch trouble
Fuel injector trouble
Loosen terminal of battery (–) cable or ECU ground lead
Carbon accumulating on valve seating surface
Engine overheating

Other:
ECU trouble
Throttle body assy not synchronizing
Engine oil viscosity too high
Drive train trouble
Brake dragging
Clutch slipping
Engine overheating
Air suction valve trouble
Air switching valve trouble
Valve timing abnormal

Poor Running or No Power at High Speed:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
Stick coil shorted or not in good contact
Stick coil trouble
ECU trouble

Fuel/air mixture incorrect:
Air cleaner clogged, poorly sealed, or missing
Air duct holder loose
Water or foreign matter in fuel
Throttle body assy holder loose
Fuel to injector insufficient
Fuel tank air vent obstructed
Fuel line clogged
Fuel pump trouble

Compression low:
Spark plug loose
Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)

Knocking:
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
ECU trouble

Miscellaneous:
Throttle valve won't fully open
Brake dragging
Clutch slipping
Engine overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Camshaft cam worm
Air suction valve trouble
Air switching valve trouble
Catalytic converter melt down due to muffler overheating (KLEEN)
Valve timing abnormal

Overheating:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
ECU trouble

Muffler overheating:
For KLEEN, do not run the engine even if with only one cylinder misfiring or poor running (Request the nearest service facility to correct it)
For KLEEN, do not push-start with a dead battery (Connect another full-charged battery with jumper cables, and start the engine using the electric starter)
For KLEEN, do not start the engine under misfire due to spark plug fouling or poor connection of the stick coil
For KLEEN, do not coast the motorcycle with the ignition switch off (Turn the ignition switch ON and run the engine)
ECU trouble

Fuel/air mixture incorrect:
Throttle body assy holder loose
Air duct holder loose
Air cleaner poorly sealed, or missing
Air cleaner clogged

Troubleshooting Guide

Compression high:
Carbon built up in combustion chamber
Engine load faulty:
Clutch slipping
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Brake dragging
Lubrication inadequate:
Engine oil level too low
Engine oil poor quality or incorrect
Oil cooler incorrect:
Oil cooler clogged
Gauge incorrect:
Water temperature gauge broken
Water temperature sensor broken
Coolant incorrect:
Coolant level too low
Coolant deteriorated
Wrong coolant mixed ratio
Cooling system component incorrect:
Radiator fin damaged
Radiator clogged
Thermostat trouble
Radiator cap trouble
Radiator fan relay trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

Over Cooling:

Gauge incorrect:
Water temperature gauge broken
Water temperature sensor broken
Cooling system component incorrect:
Thermostat trouble

Clutch Operation Faulty:

Clutch slipping:
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch hub or housing unevenly worn
Clutch master cylinder trouble
Clutch slave cylinder trouble
Clutch not disengaging properly:
Clutch plate warped or too rough
Clutch spring compression uneven
Engine oil deteriorated
Engine oil viscosity too high
Engine oil level too high
Clutch housing frozen on drive shaft
Clutch hub nut loose
Clutch hub spline damaged
Clutch friction plate installed wrong
Clutch slave cylinder trouble
Clutch fluid deteriorated
Clutch fluid leakage
Air in clutch fluid line
Clutch master cylinder primary or secondary cup damage
Clutch master cylinder scratched inside

Gear Shifting Faulty:

Doesn't go into gear; shift pedal doesn't return:
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Gear positioning lever binding
Shift return spring weak or broken
Shift return spring pin loose
Shift mechanism arm spring broken
Shift mechanism arm broken
Shift pawl broken
Jumps out of gear:
Shift fork ear worn, bent
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Gear positioning lever spring weak or broken
Shift fork guide pin worn
Drive shaft, output shaft, and/or gear splines worn
Overshifts:
Gear positioning lever spring weak or broken
Shift mechanism arm spring broken

Abnormal Engine Noise:

Knocking:
ECU trouble
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
Overheating
Piston slap:
Cylinder/piston clearance excessive
Cylinder, piston worn
Connecting rod bent
Piston pin, piston pin hole worn
Valve noise:
Valve clearance incorrect
Valve spring broken or weak
Camshaft bearing worn
Valve lifter worn
Other noise:
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring/groove clearance excessive

Piston ring worn, broken, or stuck
Piston ring groove worn
Piston seizure, damage
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mount loose
Crankshaft bearing worn
Primary gear worn or chipped
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Air suction valve damaged
Air switching valve damaged
Alternator rotor loose
Catalytic converter melt down due to muffler overheating (KLEEN)
Oil control valve damaged
Variable valve timing actuator damaged
Balancer gear worn or chipped
Balancer shaft position maladjusted
Balancer bearing worn
Balancer rubber damper damaged

Abnormal Drive Train Noise:

Clutch noise:
Clutch damper weak or damaged
Clutch housing/friction plate clearance excessive
Clutch housing gear worn
Wrong installation of outside friction plate

Transmission noise:
Bearings worn
Transmission gear worn or chipped
Metal chips jammed in gear teeth
Engine oil insufficient

Drive line noise:
Rear wheel coupling damaged
Bevel gear bearing worn
Bevel gears worn or chipped
Insufficient lubricant
Bevel gears misaligned
Tetra lever links bearings worn

Abnormal Frame Noise:

Front fork noise:
Oil insufficient or too thin
Spring weak or broken

Rear shock absorber noise:
Shock absorber damaged

Disc brake noise:
Pad installed incorrectly
Pad surface glazed
Disc warped
Caliper trouble

Other noise:
Bracket, nut, bolt, etc. not properly mounted or tightened

Oil Pressure Warning Light Goes On:

Engine oil pump damaged
Engine oil screen clogged
Engine oil filter clogged
Engine oil level too low
Engine oil viscosity too low
Camshaft bearing worn
Crankshaft bearing worn
Oil pressure switch damaged
Wiring faulty
Relief valve stuck open
O-ring at the oil passage in the crankcase damaged

Exhaust Smokes Excessively:

White smoke:
Piston oil ring worn
Cylinder worn
Valve oil seal damaged
Valve guide worn
Engine oil level too high

Black smoke:
Air cleaner clogged

Brown smoke:
Air duct holder loose
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory:

Handlebar hard to turn:
Cable routing incorrect
Hose routing incorrect
Wiring routing incorrect
Steering stem nut too tight
Steering stem bearing damaged
Steering stem bearing lubrication inadequate
Steering stem bent
Tire air pressure too low

Handlebar shakes or excessively vibrates:
Tire worn
Tetra lever link bearing worn
Swingarm pivot bearing worn
Rim warped, or not balanced
Wheel bearing worn
Handlebar holder bolt loose
Steering stem nut loose
Front, rear axle runout excessive
Engine mounting bolt loose

Handlebar pulls to one side:
Frame bent
Wheel misalignment

Tetra lever links bent or twisted
Swingarm bent or twisted
Swingarm pivot shaft runout excessive
Steering maladjusted
Front fork bent
Right and left front fork oil level uneven

Shock absorption unsatisfactory:
(Too hard)
Front fork oil excessive
Front fork oil viscosity too high
Rear shock absorber adjustment too hard
Tire air pressure too high
Front fork bent
(Too soft)
Tire air pressure too low
Front fork oil insufficient and/or leaking
Front fork oil viscosity too low
Rear shock adjustment too soft
Front fork, rear shock absorber spring weak
Rear shock absorber oil leaking

Brake Doesn't Hold:

Air in the brake line
Pad or disc worn
Brake fluid leakage
Disc warped
Contaminated pad
Brake fluid deteriorated
Primary or secondary cup damaged in master cylinder
Master cylinder scratched inside

Battery Trouble:

Battery discharged:
Charge insufficient
Battery faulty (too low terminal voltage)
Battery cable making poor contact
Load excessive (e.g., bulb of excessive wattage)
Steering lock unit trouble
Alternator trouble
Wiring faulty
Regulator/rectifier trouble

Battery overcharged:
Alternator trouble
Regulator/rectifier trouble
Battery faulty

Part No.99924-1488-03

MODEL APPLICATION

Year	Model	Beginning Frame No.
2015	ZG1400EF	JKBZGNE1□FA000001 JKBZGT40EEA000001
2016	ZG1400EG	JKBZGNE1□GA003001 JKBZGT40EEA003001
2017	ZG1400EH	JKBZGNE1□HA007001

□:This digit in the frame number changes from one machine to another.

Kawasaki Heavy Industries, Ltd. Motorcycle & Engine Company

Printed in Japan

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